INVENTORY MIGRATION FROM THE NAVAL ELECTRONIC SYSTEMS COMMAND TO THE SHIPS PARTS CONTROL CENTER

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THESIS

INVENTORY MIGRATION FROM THE NAVAL ELECTRONIC SYSTEMS COMMAND TO THE SHIPS PARTS CONTROL CENTER

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LIST OF ABBREVIATIONS

AAC	Acquisition Advice Code
AAO	Approved Acquisition Objective
AFRS	Approved Force Retention Stock
APA	Appropriations Purchase Account
BUSANDA	Bureau of Supplies and Accounts
CASREPT	Casualty Report
CENILE	Cumulative End Item Ledger
COG	Cognizance Symbol
CRS	Contingency Retention Stock
DCNM	Deputy Chief of Naval Material
DEN	Data Element Number
DIC	Document Identifier Code
DOD	Department of Defense
ECP	Engineering Change Proposal
ERS	Economic Retention Stock
FIRM	Fleet Intensified Repairables Management
FMA	Field Maintenance Agent
FSN	Federal Stock Number
HSC	Hardware Systems Command
ICP	Inventory Control Point
IM	Inventory Manager
IRAM	Improved Repairables Asset Management
MCC	Material Control Code
MDF	Master Data File
MIS	Management Information System
NAVELEX	Naval Electronic Systems Command
NAVMAT	Naval Material Command
NAVSUP	Naval Supply Systems Command
NIIN	National Item Identification Number
NRFI	Not-Ready-For-Issue

NSN	National Stock Number
NSO	Numeric Stockage Objective
O&MN	Operations and Maintentance Navy
OST	Order and Shipping Time
PLT	Procurement Lead Time
PPR	Planned Program Requirements
PRC	Planned Requirement Code
PWRS	Prepositioned War Reserve Stock
RACC/ATS	Requirements Accumulating/Acquisition Tracking System
RDD	Required Delivery Date
RFI	Ready-For-Issue
SAMIS	Ship Alteration Management Information System
SCAT	Substitutable Category
SCN	Ships Construction Navy
SDCP	Supply Demand Control Point
SDR	Supply Demand Review
SPCC	Ships Parts Control Center
UIC	Unit Identification Code
UICP	Uniform Inventory Control Point

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I. INTRODUCTION

A continuing goal within the Department of Defense (DOD) is to coordinate and consolidate inventory management functions wherever possible. Preventing two or more organizations from managing the same item or in performing similar inventory management tasks assists in maintaining a simplified material support organization within DOD and the individual services.

Stock coordination is the term used in the Navy for the administrative process of identifying and controlling material cognizance for an item, group or category of material and assigning material cognizance to a single inventory manager[1]. Stock coordination has also become synonymous with the actual yearly transfer (or migration) of items of inventory between the cognizant commands. Specifically, the objectives of stock coordination are:

> 1. To align material cognizance among Navy inventory managers to ensure continuous and effective supply support;
>
> 2. To achieve economy by reducing the number of generally similar items and eliminating and preventing duplication of management by the several Navy managers;
>
> 3. To the extent practicable, to concentrate all supply management functions for items or groups of items within the Navy under the cognizance of Navy Supply Systems Command inventory control points.[2]

The current NAVMATINST 4440.37C gives responsibility "for the overall policy and guidance in matters pertaining to the Stock coordination Program" to the Deputy Chief of Naval Material (DCNM) for Logistics. The Naval Supply Systems

Command (NAVSUP) has been tasked by the Naval Material Command (NAVMAT) to administer the Stock Coordination Program in accordance with existing Navy policy as provided by NAVMAT. The Commander, NAVSUP as administrator has the following specific responsibilities:

> 1. Perform the management (Planning, Direction, Control and Training) responsibilities for the Stock Coordination Program and chair all Stock Coordination review meetings.
>
> 2. Monitor all Navy items to ensure that an item of supply is not managed by more than one inventory manager and concurrently ensure appropriate material management assignments within the Navy.
>
> 3. Develop, coordinate with SYSCOMs, and publish in January of each year a schedule of stock coordination reviews by cognizance symbol to be conducted during the calendar year.
>
> 4. Develop and maintain in federal stock number sequence a mechanized file of all SYSCOM managed items with related federal cataloging data required to conduct a stock cocrdination review meeting. Listings from the mechanized file will be provided to SYSCOMS, three months prior to a scheduled review.
>
> 5. Establish uniform format and procedures for item transfer actions, including reports to DCNM (Logistics), for those actions consummated as a result of a stock cocrdination review meeting. [4]

Although the primary inventory management responsibilities in the Navy are assigned to NAVSUP's Inventory Control Points (ICP's), many other Navy activities such as the Hardware Systems Commands (HSC) find it necessary to manage small inventories in performing their primary duties. HSC's are responsible for the development, planning, programming, acquisition, installation, logistics, and technical support and guidance for a particular class of weapons systems and their related equipments required in support of all facets of naval operations throughout the system/equipment life cycle[3]. The Naval Electronic Systems Command (NAVELEX) is the HSC which maintains

temporary inventories during the design and development of new Navy electronics material or hardware. As a consequence, NAVELEX must be responsive to the criteria for stock coordination as set forth in the NAVMATINST 4440.37 series [4]. In particular, NAVELEX and the other systems commands are responsible for the following:

> 1. Designate stock coordination representatives to assist in determining appropriate material management assignments.
>
> 2. Thirty days prior to a scheduled meeting, return to NAVSUP one copy of the FSN (Federal Stock Number) listing appropriately annotated with the prescribed criteria. Requests for reverse migration transfers will be forwarded to NAVSUP together with supporting rationale.
>
> 3. Maintain adequate technical documentation to justify material retention at the SYSCOM under criteria code 3 (unstable in design).
>
> 4. Coordinate item transfer dates, technical data requirements, and contract administration requiremements with NAVSUP and the receiving activity with full consideration given to the budget cycle to permit orderly assumption by the receiving ICP of all budgetary responsibilities for the items being transferred. Provide to NAVSUP within forty-five (45) days a schedule of item transfers which have been coordinated with the receiving activity. [4]

NAVMATINST 4440.37C also lists four retention criteria (and their codes) which a systems command or its field activity may use to justify their managing the inventory of an item. These criteria and two others (code 0-withdrawal of interest; and code 5-selected for transfer) are assigned by the HSC to each item in the inventory and are updated prior to each periodic stock coordination review. At the review, the particular criteria assigned to each item may be accepted or challenged by NAVSUP, NAVMAT, or the ICP. Those criteria which are challenged must be resolved during the review. The four HSC retention criteria are as follows:

1. Items in a Research and Development Stage.

Items qualifying under this category must be under development and not yet in Fleet operational use.

2. Items Requiring Engineering Control Decisions. This criterion is applicable when a high degree of engineering judgement is required concerning design or relationships to a system. It pertains principally to those items requiring engineering decisions during production or prior to each issue. Items that remain in this category after two (2) years of operational use must be justified in the same manner as Criteria Code Four (4) items of this instruction.

3. Items Unstable In Design. Items which are determined by an engineering decision to be highly subject to design change of the item itself, or replacement of the item through modification of its next higher assembly. End items, components, assemblies, test and evaluation equipment unstable in design do not exclude their intrinsic parts from stock coordination review. Items retained for management under this category will be transferred to an ICP after completion of (2) years operational use unless a major design change or modification has been approved and/or is being accomplished at the time of the Stock Coordination Review. Further retention upon completion of the approved design change or modification must be justified in accordance with Criteria Code Four (4).

4. Items Expressly Assigned to a Single Command Management by Separate Authorizing NAVMAT Directives. Items qualifying for this category are limited to items of major importance and depot level reparables. Inclusion in this category is a matter for CNM decision based upon justifying rationale submitted by the originating Command. As a general rule items changed from Criteria Codes (2) and (3) into this code will be transferred to an ICP for inventory management even though the procurement function remains at the headquarters level. Items assigned under this criterion will be considered as an adjunct to stock cocrdination and therefore, are not precluded from formal review when scheduled.[4]

In recent years the absence of an active stock coordination effort between the HSC's and the ICP's has motivated the Chief of NAVMAT in a letter dated 9 July 1976, to direct that action be taken to re-initiate stock coordination proceedings and called for specific reports from the HSC's and NAVSUP concerning the status of the HSC inventories, the status of currently scheduled stock coordination reviews,

recommendations and comments concerning ways to improve the reviews, and "the degree to which remote terminals and UICP(Uniform Inventory Control Point) programs are/are not being used to manage items retained at Headquarters level[5]." The letter also re-emphasized the requirement for stock coordination reviews and set an arbitrary goal of 25 percent of the HSC inventories to be transferred to an ICP or to be deleted from all inventory management during the next yearly stock coordination cycle.

II. HISTORY OF THE NAVY SUPPLY PLAN

The Navy Supply Plan of 1947 had as its primary objective the establishment of an integrated supply complex in support of the basic Navy programs. At that time the Navy was tasked to develop its plan following the DOD policy statement:

> Within each military service (Army, Navy, Marine Corps, and Air Force) there shall be established and maintained but one single supply and inventory control point for each category of items.
>
> The total volume of inventories should be analyzed and reviewed by all services and reduced so far as possible in conjunction with the assigned mission of the respective departments.[6]

The Navy Stock Coordination Program, as a result of these objectives, became a reality in a memorandum of 5 December 1950 from the Chief, Bureau of Supplies and Accounts (BUSANDA), now NAVSUP, to the Navy Supply System inventory managers. Initially the stock coordination concept appeared to be directed only at the ICP's which were then called Supply Demand Control Points(SDCP), but it quickly grew to include the technical bureaus, now HSC's. The first definition of stock coordination reflected this emphasis:

> Stock Coordination is the process concerned with the elimination where practicable, of outright duplication; the prevention of potential duplication through provisioning; the utilization of material in the system in lieu of new procurement; a logical reassignment of similar but not identical items which are managed by several supply demand control points; and a reduction in the range and kinds of material through standardization and simplification

programs.[6]

How to best implement a stock coordination policy was the subject of a study by a special Ad Hoc Committee of BUSANDA in 1951. This committee prepared a report which contained as one of its recommendations the establishment of a supply coordinator within the BUSANDA organization. This recommendation resulted in the establishment of a Stock Ccordination Division in BUSANDA on 31 July 1952. The new division was tasked with responsibility "for the develcpment and implementation of material cognizance ccntrol policies and cognizance control allocation procedures for the Navy Supply System."[6]

Developing the principles and policies was one of the first orders of business after the new division was fully staffed, and the policies had to be created in a manner which would support the primary objective of the Navy Supply Plan. The first principles and policies were also developed in conjuction with the technical bureaus before being published (See Appendix A for a complete listing). For comparison, the current list of established principles and policies of stock coordination is provided in Appendix B. Although no documentation is available to trace the evolution of the current list from the first one, the reader readily notices that it has expanded considerably.

Along with development of the principles and policies, the Stock Cocrdination Division also sought to develop some objectives cf stock coordination which would not only support the Navy Supply Plan but also improve the effectiveness and economy of the supply system. These objectives differ somewhat in emphasis from the current ones which were stated in the introduction. They are provided, again for comparison:

1. Realignment of the material missions of the SDCP's to maximize supply responsiveness to

the basic Navy programs.

2. Purification of the Supply System to reduce to a minimum, multiple management of identical material, and the number of sizes, kinds and types of generally similar items.

3. Containment of the input of material to that determined essential to the support of authorized Navy programs.

4. Maximum utilization of inventories.

5. Simplification of the supply problems of the consumer.[7]

Although these objectives make no specific mention of inventory control at the technical bureaus as distinguished from that at the supply demand control points, it should be noted that this subject was covered in the original policies and principles.

The last area for which stock coordination became responsible was in controlling the input of material, or provisioning. This occurred in 1954. "The Navy Supply System is first apprised of its repair part support responsibilities with respect to the equipment" during provisioning. It is a logical area of effort within stock coordination because the prevention of duplication and errors at the material input point is absolutely necessary in maintaining control of the long run program [7].

New procedures had to be devised in order to successfully transfer inventory management functions from one activity to another. Formal guidelines had to be established, new financial and accounting procedures were required, new terminologies and responsibilities required defining, a formal provisioning program had to be established, a central cataloging and numbering system was required, and a means of exchanging information between commands was required. All of these requirements were successfully initiated to a degree which allowed the program to begin, and efforts to improve these requirements are continuing today.

The effort to centralize inventory control functions at the SDCP's began almost immediately and between July 1954 and March 1957 "34,344 line items valued at $500,000,000 were transferred from the technical bureaus to the SDCP's, as directed by SECNAVINST 4408.1 of 30 November 1953 "[6]. In spite of some very recent interruptions, this process has continued to the present. For example, in the past six years NAVELEX has transferred over 3,000 line items.

By 1957, the centralized control of stock coordination by BUSANDA had been reduced to the point where most individual item transfers were accomplished by the SDCP's without clearance from BUSANDA. Initially, centralized control was strong to prevent either (1) misinterpretations as to definitions of item category responsibilities which might cause cognizance transfers in all directions or (2) the creation of excessive workloads.

The stock coordination program has been successful to the extent that today the total number of line items within the Navy which are managed outside the Navy Inventory Control Points is 18,000, approximately three percent of all Navy managed items. It is this remaining three percent towards which the current NAVMAT effort is directed.

III. THE PROBLEM

The basic problem within the stock coordination program is how to identify candidate items for transfer such that the items which remain at the non-ICP activity (in this case NAVELEX) are only those items which can best be managed at that command.

The requirement placed by NAVMAT on the HSC's to transfer or delete 25 percent of their inventories during the next stock coordination process and the increased emphasis in the pursuit of an effective stock coordination program have highlighted various bottlenecks in accomplishing this requirement. Some of the bottlenecks are the result of individual philosophies and interpretations throughout the many decision levels at the commands involved in the program. Other bottlenecks are created simply by existing organizational procedures.

A major problem that surfaces in transferring inventory management responsibilities between NAVELEX and SPCC involves the basic differences in inventory management philosophies and policies. Transferring control to SPCC naturally concerns some individuals at NAVELEX because they fear a loss of control and individual attention that they have been able to provide for some of their items of inventory in the past. Those items within the NAVELEX inventory are designated 2Z cognizance (COG) material. The majority of these, when transferred to SPCC, become 4G COG items. This inventory of NAVELEX 2Z items is considered by NAVELEX to be nearly 100 percent program related, that is, many of the items are designated for a particular end user. This program-oriented inventory results from the basic NAVELEX responsibility to various Chief of Naval Operations (CNO) sponsors and other government agencies. NAVELEX

control in issuing this material is felt by some to be essential in avoiding missed future committments. Although many low demand and program related items are managed at SPCC, computerized inventory models dominate and are primarily designed to handle items with higher and less predictable demand patterns.

The average 4G COG electronics inventory manager at SPCC manages approximately 3000 line items. On the other hand, NAVELEX inventory managers handle approximately 100 items each and tend to do so on a manual basis with an assist from a requirements and acquisition tracking computer management information system.

Identifying when personnel resources should transfer with the management function is still another problem which has hindered previous stock coordination reviews. Although this problem was largely remedied in the NAVMAT letter of 9 Jul 1976 which stated that such compensating personnel and funding resources were not a requirement in transferring material, it still remains as a possible management problem in terms of the allocation of scarce resources. However, the current stock coordination Principles and Policies recognize that situations may exist which require a redistribution of resources to ensure equitability (see Appendix B, item 24) [5].

A third problem area involves the assignment of the retention criteria to individual items in the NAVELEX inventory during the initial review process. Obviously an item should remain external to the NAVSUP supply system only as long as NAVELEX is the only source of expertise which can provide constant technical support to the item. However, terms such as "high degree of engineering judgement" or "highly subject to design change" are not easily quantifiable(these criteria were listed in the Introduction).

The primary basis for these retention criteria was related to engineering or technical problems with the HSC

inventories. Additional criteria are now being considered. One such is the "family grouping" concept which considers how an item relates to other similar items. Some of these relationships include the degree of substitutability between items, the differences in capabilities and the interchangeability of spare parts. A tremendous potential exists for saving a significant amount of Navy budget dollars in this area as well as helping to identify candidates for transfer if an objective system of identifying family relations can be determined.

IV. THE PLAN OF ANALYSIS

In order to develop a meaningful set of criteria relating to stock transfer between NAVELEX and SPCC a thorough understanding of the problems inherent in stock transfers was required. To obtain as much information as possible about current programs and procedures relating to item management and stock transfer, a fact gathering process was initiated. This process required (1) visiting activities involved in the stock coordination process, (2) a literature search, (3) telephone inquiries, and (4) a computer analysis of the past demand history of 2Z COG material.

An introduction to stock coordination was provided during a visit to NAVELEX in June, 1977. Brief presentations were provided on the overall stock coordination process as seen from the NAVELEX point of view and specific problems with past transfers were highlighted. Information on NAVELEX management philosophies and current problems was also provided.

In order to obtain a different perspective on the problem, representatives at NAVSUP were contacted. Their analysis of past problems in stock coordination and their feelings regarding items which should be managed by the HSC's provided a beneficial alternative point of view.

Material gathered from this first series of visits was studied in preparation for a visit to SPCC, the primary receiving point for material transferred from NAVELEX. The visit to SPCC in September, 1977 provided yet a third perspective to the problem.

A follow-up trip to NAVELEX as well as NAVMAT provided additional background material with a discussion of some initial ideas regarding stock coordination procedures and

past problem areas.

The second stage of the research process involved the study of reports and other documentation which had been collected from the various commands involved in the transfer process.

Questions which arose during the course of the research were normally answered through extensive telephone contact with the commands involved in the stock coordination process.

Finally, a computer analysis of past 2Z cognizance demand data was undertaken. The point of this analysis was to determine if any characteristics in the demand data might suggest a set of criteria which could be explored and possibly used in recommending an item for transfer. The data base for this analysis was the Cumulative End Item Ledger (CENILE) which is a Transaction History File of 2Z cognizance material. This data base is maintained by SPCC and is a derivative of the Master Data File. Once weekly when SPCC's Transaction History File is updated, the CENILE is also processed for update. Since the CENILE is basically a version of the MDF, its validity is considered excellent.

Appendix C provides a key to the various elements contained within each record on the CENILE tape. Data is configured on the tape in stock number sequence with records within stock numbers broken down by the Unit Identification Code (UIC) of the requisitioning activity.

In analyzing the data from the CENILE tape, each transaction for a particular stock number was put through a filter process to determine if it was a demand and, if so, what type. Since a transaction is composed of any number of actions by various activities within the requisitioning process, care was taken to group all records associated with a unique requisition document number and to identify only the first of these records in determining the type of demand encountered. Throughout this analysis each unique transaction was considered a demand irrespective of the

total quantity requisitioned. In other words, requisition size was not an item studied. The CENILE record hierarchy was similar to the one utilized in a thesis written by McCarthy, et al [3]. Appendix D provides an in-depth overview of the actual screening procedure utilized and contains the assumptions made to classify the various records into specific types of demand categories.

The utilization of a computer program enabled an analysis of the entire active population of stock numbers managed by NAVELEX whereas the thesis of McCarthy, et al, utilized a manual screen process which necessitated looking at a sample of only 396 items. While many of the initial conclusions of this analysis are similar and supportive of the McCarthy, et al thesis, the capabilities of the software package developed to analyze the CENILE data allowed for a much deeper analysis of each active 2Z cognizance stock number. The final result of the data analysis was specific summary information regarding demand by type and time (in quarters) for individual stock numbers. For readability this information was displayed in the format exhibited in Appendix E (Demand Tableau Samples).

Demand data on the CENILE tape was divided into the various categories in order to determine the relationship of unplanned demand totals with respect to total business. The tableau format provided 12 quarters of demand data categorized into one of the following types: Casualty Reports (CASREPT), Unplanned Afloat, Unplanned Other, PPR Afloat, PPR Other, or Total Business for the three year period. These categories were chosen so that stock numbers experiencing unplanned demands (including CASREPTS) could be investigated with regard to the premise that NAVELEX should not be managing material which experiences a significant amount of unplanned demand.

Very recent information obtained from NAVELEX suggests that the PPR's identified in the analysis may be understated. The analysis assumed that documents with

document identifier code (DIC) 100 were always Planned Program Requirements (PPR) cancellations when in fact the DIC 100 documents were also used to ensure removal of completed PPR's from the PPR file at SPCC.

V. RESULTS OF ANALYSIS

The Stock Coordination Program is comprised of and interacts with many Navy Supply Programs. Only through an understanding of programs such as Planned Program Requirements, Repairables, Disposal, and Budgeting is it possible to gain some insight into the Stock Coordination Program and the effect of each on the goals of stock coordination.

A. PLANNED PROGRAM REQUIREMENTS

1. NAVELEX Planned Program Requirements

Material in the NAVELEX inventory is justified and financed through the budget process as planned or scheduled, nonrecurring requirements. Each item is initially purchased and designated for a particular customer and although the requirement for the material or the supporting program(s) may change, the inventory manager (IM) is responsible for ensuring that the material is available when needed. The IM is assisted in this task through an interface of computer programs between NAVELEX and SPCC. NAVELEX managed items are processed and managed through a direct link with SPCC's Uniform Inventory Control Program (UICP) data base.

The material management system at NAVELEX, which is also the management information system (MIS) for all levels of management there, is called the Requirements Accumulating/ Acquisition Tracking System (RACC/ATS).

> RACC/ATS maintains records of all NAVELEX requirements authorized in the Five Year Defense Plan (FYDP), it determines when acquisition action will have to be initiated,

> what source is to be utilized, what the respective cost is estimated to be. Additionally, RACC/AtS tracks the flow of documentation through NAVELEX. With respect to procurement actions it consolidates requirements, checks stock assets, determines cognizant procuring activities, checks existing contracts for uncommitted options or multi-year quantities unexpended, generates schedules to meet RDD's (Required Delivery Dates) and monitors specific milestones to alert management to possible problem areas.[3]

RACC/ATS also provides some limited assistance to the inventory manager in equipment interchangeability screening for possible substitutes of items within the same equipment category or family. Although not designed specifically for this purpose, the SCAT (Substitutable Category) Code is one tool used for this screen, but it neither relates to nor interfaces with the family/group coding scheme at SPCC. This subject of equipment substitutability will be discussed in more detail in a later section. An assist is also provided through a screening test of not-ready-for-issue (NRFI) assets for the availability of inductable material for overhaul/repair. But of all the functions performed for the IM by RACC/ATS, perhaps the most important is the tracking of material from the initial requirements determination through the complete acquisition cycle to the final delivery of the material to the end user. Once a specific customer can be identified and input to RACC/ATS and the asset screening process during the cyclic update has been performed, the interface with the UICP allows RACC/ATS to assign a requisition number to the material designated for that customer. This requisition number is then established on the Planned Program Requirements (PPR) file at SPCC for use in protecting these scheduled requirements, and a mandatory action date, which will be defined later, is computed by subtracting 120 days from the Required Delivery Date (RDD).

The RACC/ATS program utilizes PPR's to protect quantities of equipments during tests such as the screen for

unreserved ready-for-issue (RFI) assets and the screen for induction availability. The PPR program is one of the key programs within stock coordination since it provides the primary means by which NAVELEX can indicate what program related material requires protection from unauthorized issue after it has been transferred to SPCC management. This becomes extremely important in avoiding litigation procedures resulting from missed schedules due to unavailable government material.

2. NAVSUP Planned Program Requirements

Planned Program Requirements as viewed by NAVSUP include:

> Any known or anticipated, funded or unfunded project or program related requirement which cannot be predicted within the UICP cyclic levels forecasting techniques [8]

The PPR computer file at SPCC is only a record keeping process which is designed to interact with other UICP operations in identifying those items which require protection. For this reason it becomes important to ensure that file maintenance on PPR's is timely and accurate.

Three general reasons can be listed for establishing PPR's at SPCC;

> 1. To retain stock in the system regardless of the demand for the item.
>
> 2. To inform the system that a nonrecurring demand will occur on a specific date in the future.
>
> 3. To maintain a level of stock at an activity as an added cushion against running out of stock.[8]

For example, a PPR record may be created to protect a system wide asset of a particular item of stock as Prepositioned War Reserve Stock (PWRS). This is material which must be kept on-hand in a sufficient quantity to enable mobilization

in the event of war [9]. PPR's may also be used to protect system stocks by creating fixed layers of safety stocks, creating temporary requirements to prevent excessing material when periods of low demand occur, or to temporarily support a procurement which is larger than that which could be supported and generated by demand forecasts. This last reason for protection must also be justified by a specific program and must be approved at either the division or command level.

With approval by the ICP or higher authority localized protection can be provided by PPR's. Reporting Navy stock points can protect their individual levels of stock from requisition referrals except those with high priority, and special Repair Pools can be created at an activity as one justification for carrying more stock of an item. Other Navy activities, including the HSC's, also use PPR's to protect stock which is to be used on future projects.

The PPR file is used primarily at SPCC in conjunction with three other programs; Stratification, Supply Demand Review (SDR), and Repair Scheduling. stratification is SPCC's program for planning and monitoring the inventory budget [10]. PPR records assist "stratification" in identifying projected requirements which may need funding or in identifying projected purchases of unreserved but scheduled requirements. SDR and repair scheduling are the programs which periodically check to see if enough material will be available when and where it is needed [9].

There are several different classifications of PPR's which will be discussed later, but all PPr's share some common characteristics. For example, PPR records lodged on the file will remain there until they are purged for age or the material is issued and the issue is recorded using exactly the same document number recorded in the file. Most PPR requirements can be established up to nine years in advance of the requirement. An exception is the deferred requisition type of PPR which can be established only up to

two years in advance.

The PPR file requires that inputs be validated prior to being established on the file (see Appendix F for a flow chart summarizing steps for initiating and checking PPR's by this file). Initial validation includes checking for garbled, incorrect, or missing information. Data entries such as National Stock Numbers (NSN) which replaced FSN's, Cognizance Symbols (COG), Material Control Codes (MCC), and Acquisition Advice Codes (AAC) are checked to ensure that the item is managed by SPCC. Finally, the requirement is also checked to make sure that it is held at a reporting stock point. The PPR file will also reject duplication. New records input to the file cannot match other existing records.

After a PPR record is established a Planned Requirement Code (PRC) for that individual record will be assigned to the record to indicate what action the system must take to support the requirement. This code is based on the input document. Any future changes or cancellations will generally require special Document Identifier Codes (DIC) which correspond to the input DIC.

SDR triggers are indicators to the UICP operation that a Supply Demand Review is necessary for a particular item. The PPR periodic review program called "PPR BROWSE" checks PRC's and RDD's to see if a trigger is necessary. An SDR trigger may also be generated if the review determines after establishing a PPR that (1) the same material was disposed of within the last 180 days, (2) the PPR is being established within the procurement lead time (PLT) and the system assets are insufficient to support the requirement, or 3) the PPR is being established within an Order and Shipping Time (OST), which is normally input at 30 days, and the supporting stock point assets are less than the PPR quantity.

PPR's are normally considered as protected assets which are used to satisfy a nonrecurring demand on a specific

date. However, a fixed level of stock may also be protected if desired by setting the RDD to all "9's".

A "deferred requisition" is a special PPR which allows the customer to submit a standard funded requisition with DIC A0 series directly to the ICP. The key data entry on the requisition is the indication of an extended RDD by entering an alpha "S" in card column 62. Card columns 63 and 64 are used to indicate the number of months remaining until the material is required (up to 2 years maximum). The actual RDD is determined by multiplying the number of months by 30 and adding this total to the requisition date.

If the extended RDD is within two months of the current date, the ICP will handle the request as a normal requisition. Otherwise, after the requisition passes the validation checks, it will be entered on the PPR file and processed in the same manner as the Navy customer requested PPR which is discussed below. Deferred requisitions are currently being emphasized as the preferred method of PPR input, primarily because of a reduced workload for both the requisitioner and SPCC. For example, establishment, validation, and requisition input is accomplished with one document instead of three. This single transaction also avoids the requirement for a precise requisition and PPR record match which is not always possible and has caused some of the program deficiencies which will be discussed later.

Those PPR's with specific RDD's fall into three general classifications according to the originating source. One type of PPR is that requested from a DOD activity/customer excluding Navy customers. This classification, which is also called Special Program Requirements, will not be discussed since it has no application to the current topic.

The second classification and one which has significant potential application to the NAVELEX-SPCC interface is the PPR generated by Navy customers external to SPCC. As mentioned previously, this type of PPR utilizes its own DIC

(BP series) and may be requested and established up to nine years prior to the RDD. The system, however, requires a certain general sequence of events to occur before the PPR can be satisfied (See Appendix F for a summarized flow chart of these details).

At RDD minus PLT minus 30 days SPCC will generate a final request for confirmation of the requirement tc the requesting Navy customer. If SPCC does not receive confirmation by RDD minus PLT, the PPR will be cancelled. Prior to confirmation, stock will be retained but will not be purchased or redistributed. Also, PPR's submitted with insufficient PLT and system assets will be rejected and returned to the customers for possible extensions of the RDD.

Another current constraint requires the PPR to be established at least 90 days prior to the RDD. After the PPR is established, the Family/Group relationship coding on the MDF at SPCC also plays an important role in how any particular item will be protected. Only non-family/group related material is protected/reserved at the supporting stockpoint because no other item may be substituted fcr it. All other PPR's are only protected from requisitions which reach the ICP (SPCC) level during the referral process since there is some likelihood of a similar item being available to satisfy the requirement.

Once the PPR has been confirmed, SPCC will fund the requirement through the PLT horizon and initiate procurement action at RDD minus PLT if necessary. Theoretically, the requesting customer is then obligated to pay for the material when it is issued, and the PPR is considered to be in a funded status. The confirmation point also causes the PPR to become constrained by other system functions which may have been generated in support of the PPR. In general, once the PPR has been confirmed only quantity reductions which are economically feasible and RDD extensions are allowed. For example, quantity reductions or cancellations

must currently exceed 100 dollars to be considered worth the paperwork processing costs.

When the time clock reaches RDD minus 30 days (OST), SDR triggers are generated to review for possible material redistribution if the requirement cannot be satisfied by the supporting stockpoint.

If the RDD passes and the material is not drawn from stock by RDD plus 31 days, SPCC will send the first follow-up to alert the customer. At RDD plus 61, if the material has still not been drawn, a second follow-up will be sent to the customer and NAVSUP will be notified that the PPR material is not being utilized. When RDD plus 91 is reached and if the material has not been drawn or the PPR record remains on the file for any reason such as an error in processing, it will be automatically deleted. A requisition processed at any time prior to this which matches the PPR record will automatically remove the PPR record from the file.

The third and last category of PPR's with RDD is also the type of PPR used most often. This PPR is generated internally at SPCC either manually by an inventory manager, which is called a "bookkeeping" entry, or through an automated input such as that provided to accomodate the Ship Alteration Management Information System (SAMIS) [3]. The provisioning program at SPCC is the primary source of internal PPR's, but manual inputs by the inventory manager can be justified for the three general reasons listed previously or through written requests from NAVELEX during the stock coordination transfer process. PPR's assigned by RACC/ATS for NAVELEX on the 2Z MDF are automatically transferred when the item transfers to SPCC management, but any desired PPR's not already established should be justified in detail in the remarks section of the Stock Coordination Worksheet which is provided by NAVELEX for each item that transfers. The inventory manager will then have the necessary information to investigate the item further or

to provide protection through the PPR method or any other method which will satisfy the requirements.

The general time flow for internally generated PPR's begins prior to the RDD minus PLT. During this period the PPR must be validated and established and the majority of any changes or cancellations must be completed (See Appendix G).

At the Review Date (RDD minus PLT) a review is conducted to determine if procurement action should be initiated. After this date, change and cancellation requests must pass system tests before they are accepted.

A Mandatory Action Date is normally designated at RDD minus 45 days for DIC's 102 and 103 which are the ones used for establishing internal PPRs. DIC 103 is rarely used, therefore the Mandatory Action Date is generally for DIC 102 and designates the time at which a reservation directive is sent to the supporting stock point to protect the material from unauthorized issue. However, any valid date may be input for this purpose. Prior to this, the established internal PPR will be protected at SPCC, but not necessarily at any particular stock point. SAMIS generated PPR's are the exception to this rule. These PPR's are automatically protected at the stock point after the PPR record is established and the PLT horizon has been entered. As was noted on page 27, RACC/ATS generated PPR's reach a Mandatory Action Date at RDD minus 120 days.

"Alert Cards" are generated at time RDD minus 30 days for the primary purpose of notifying the responsible inventory manager that a manual review should be conducted to determine if the RDD should be extended to protect the PPR. Information on overhaul schedules is one source used during this review.

If the RDD passes and the material is not drawn from stock by RDD plus 30 days, the record will be deleted. Of course, a drawdown requisition received before this point which matches the PPR record will automatically remove that

record. PPR's established for 2Z cog NAVELEX material at this point generate a requirement for review rather than automatic cancellation.

The actual processes involved in maintaining and utilizing the PPR program are much more complicated than the general descriptions above indicate, but to discuss the program in detail is beyond the scope of this report. The complexities of the program imperfections resulting from interface problems with other programs have caused deficiencies, many of which have been identified by SPCC and are listed below:

1. Requisition document data entries must match the PPR record exactly in order to remove it from the file. As a result, many records are delayed in being removed from the file. These delays inflate the total requirements.

2. A PPR file document number is normally assigned with a date corresponding to the date of establishment. Ships Construction Navy (SCN) funding policy requires requisitions which cite those funds to use the current funding year in the document number. This document number mismatch will prevent the PPR record from being deleted.

3. Document numbers are not required in the provisioning process. As a result, the document numbers on the drawdown requisitions have nothing to match with on the PPR records. Therefore, these PPR's must be periodically reviewed and removed manually.

4. A requisition submitted by a customer which should have referenced the PPR record but did not will use material designated for recurring demands or cause a backorder rather than reducing the PPR quantity.

5. Some internally funded and generated PPR's are protected from issue only at SPCC and not at the stock points. This may allow an insufficient quantity to be available within the system to satisfy the requirement.

6. PPR's may be established but may never get the funding to allow stocking the material. PPRs generated

external to SPCC will be deleted during the confirmation process. Internal PPRs will face management decisions as to whether they should be deleted or not.

7. Stockpoint reservation directives may not be issued in time to prevent material from being issued to the wrong customer. Long procurement lead time material issued incorrectly may cause significant program delays and/or create costly litigation proceedings.

8. High priority/ Casualty Report (CASREPT) requisitions may override a PPR requirement and cause schedule delays and litigation proceedings in the same manner as number (7) above. [8]

Although not a part of the PPR program, the Numeric Stockage Objective (NSO) can be applied as a stocking authority which also is not based on demand. A brief introduction to this relatively new concept in protecting material seems relevant at this point, particularly in comparison with PPR's.

> Numeric Stockage Objective items normally are of two types: insurance items and material positioned in advance of demand. Insurance items include those items which should be obtained as a safety reserve either because of their effect on health and morale or of their military essentiality. Except in isolated places, insurance items are not items which are readily available in the supply system. Good examples of the second type of NSO items are those appearing on an allowance list. This material is usually positioned to support specific equipments in advance of experiencing demand. The requirement is validated frequently, and when sufficient demand has been experienced, the material is recategorized as demand based. After a reasonable period, if there has been no demand, the stock is reviewed to determine if there is a continuing requirement. [11]

An NSO differs from a PPR in a number of ways. An NSO is designed to protect a minimum reorder level from the exponential smoothing method of forecasting when a minimum requisition quantity must be available for practical application. It is also designed to provide temporary

protection to a quantity of stock until a sufficient demand pattern is established to justify a continued stocking level, whereas a PPR record is established for a one time use by a specific customer or to build a relatively permanent level of stock protection above what can be justified by recurring demand. Minor differences include the basic reasons for establishing the protection and the fact that the PPR file is maintained separately from the MDF while NSO's are lodged directly on the MDF. This latter difference makes the NSO a continual part of the item record on the MDF while PPR file updates must await the periodic update of the Data Element Number (DEN) in the MDF in order to record changes in that file. NSO's are also not subject to any systematic review process such as the PPR periodic review, and are funded internally at SPCC as peacetime requirements, whereas a PPR may be funded from any number of sources.

B. REPAIRABLES MANAGEMENT

1. NAVELEX Repairables Management

Management of NAVELEX material is divided among various inventory managers such that each manager has cognizance over approximately 100 items. As his main management tool, the IM utilizes the RACC/ATS program to ensure asset availability for planned requirements. Material to meet these requirements comes from procurement, repair of Not-Ready-For-Issue (NRFI) material, or assets available due to program slippages.

The data analysis results (see below in the section titled "Transaction Analysis of NAVELEX Items") imply that unplanned demands represent a significant amount of NAVELEX's overall business; however, these types of requirements appear to be managed strictly on a manual

basis. Procurement funds are not authorized for material to meet these unplanned demands and, accordingly, these requirements must be filled from material obtained through the repair cycle, diverting assets reserved for future planned requirements, or from assets made available through such programs as "Strip Ship".

Currently the inventory manager is required to submit annually a two-year budget projection of funds required to support the repair of NRFI material. These estimates have been significantly understated and, accordingly, NAVELEX's Operations and Maintenance Navy (O&MN) repairables account has and still is experiencing significant funding shortfalls.

2. SPCC Repairables Management

The main emphasis of repairables management at SPCC has taken place during the last five years when it became evident that improved repairables management was necessary to maximize material readiness within constrained resources. Further, considering that repairable items represent 80 percent of the total ICP business, more attention was, and continues to be necessary to ensure effective utilizatiion of these inventory resources [12].

Histcrically, the Improved Repairables Asset Management (IRAM) program was developed as SPCC's first step towards improved repairables management and enabled a stricter mcnitoring of repairable items at the organizational and depot repair levels. In order to implement the general goals of IRAM, SPCC designed a more detailed operational program designated the Fleet Intensified Repairables Management (FIRM) program which conforms to the objectives of IRAM . The goals of the FIRM program are:

1. Maximize return of NRFI (Not-Ready-For-Issue) carcasses to the supply system.

2. Minimize repair in-process time at designated overhaul points.

3. Expedite handling and movement of all FIRM assets, both RFI and NRFI at all times.

4. Exercise positive issue control over all FIRM assets to ensure issue of material for only bonafide requirements [13].

The IRAM and FIRM programs are very much in use today. SPCC currently manages approximately 2,000 of their 12,000 4G COG items as FIRM [13]. These 4G COG items and other repairable material managed by SPCC also has the benefit of the various Uniform Inventory Control Point programs (UICP) which are designed to support equipments by forecasting future demand requirements based on past demand history. SPCC satisfies these requirements through a stratification program [10] which designates the source for a particular replacement component from either the repair cycle or through procurement. The inventory manager's manual on "Repairables" contains a more in-depth analysis on specific UICP repairables programs [14].

Discussions held during visits at SPCC also pointed out that because of the improved credibility created as a result of management innovations in the repairables area, recent budget decisions by the funding chain have at least temporarily corrected the past problems of underfunding in the 4G cognizance O&MN repair funding area.

C. SPCC DISPOSAL PROCEDURES

One concern expressed by NAVELEX about transferring control of the inventory management function to SPCC is that the material may not experience enough demand to justify retention during the computer screening process. The concern reflects a fear that material which may have a valid future requirement will be disposed of. Required material, for the most part, is protected through the numerous

screening steps which an item must pass in order to become a disposal candidate.

The disposal process actually begins during the semi-annual Stratification when the projected budget requirements identify potential excess quantities of material. Potential excess is that quantity of assets greater than the Retention Limit which consists of the Approved Acquisition Objective (AAO), the Approved Force Retention Stock (AFRS), the Economic Retention Stock (ERS), and the Contingency Retention Stock (CRS). The AAO is the level of stock determined by the demand for the item. The AFRS consists of all categories of war reserve stock for mobilization. ERS is that quantity of stock which is more economical to retain than to dispose of, and CRS is insurance stock which cannot be justified by a specific requirement or which does not have a predictable demand pattern. Material required by older ships/aircraft or which supports out-of-production equipment are examples of this type [15]. Screens within these categories and numerous others have been entered into the disposal routine in order to avoid disposing of material which retains some probability of being utilized in the future. One such screen includes a review of possible excess assets within a family of items in addition to looking at individual items.

Even if an item fails protection after all the screens and a quantity is identified for potential disposal action, a manual review is still necessary for many items. The 2Z COG items which transfer from NAVELEX to SPCC normally become 4G COG and continue to be Appropriations Purchase Account (APA) items. APA items identified as disposal candidates must be screened manually by the responsible engineering activity for the item. In this case the 4G cog electronics material engineering activity is NAVELEX, and all APA excess and deletion candidates are approved for disposal by NAVELEX prior to SPCC taking action. Therefore, unless the material is transferred to 1H cog (non-APA),

NAVELEX will have the final say in any computer generated disposal recommendations.

D. TRANSACTION ANALYSIS OF NAVELEX ITEMS

The CENILE tape contains demand data covering the period 1968 through 1977. The period 1975 through 1977 was selected for the analysis in order to concentrate on the most current data and to avoid earlier errors in the data base which were corrected during 1974.

The tableaus which were described in the plan of analysis section provided a foundation for alternative methods of data display and analysis. A total of 960 of these tableaus were generated, representing those stock numbers which experienced at least one transaction since 1968. Tableaus were not generated for inactive items since such items do not appear on the CENILE tape.

The 960 stock numbers experienced a total of 27,008 transactions for the three year period. These transactions were further identified by corresponding year, namely, 10,930 in 1975, 9,614 in 1976, and 6,465 in 1977. Table 1 in Appendix H (Frequency Distribution Tables) provides a breakdown of the number of stock numbers experiencing a given number of transactions during the 1975 to 1977 time period. For example, 144 stock numbers experienced no business, while one stock number experienced 690 transactions during the three years.

Another way of exhibiting the total business activity experience by NAVELEX is represented in Graph 1 of Appendix I (Cenile Record Maldistribution Curve). This graph is a curve which plots the cumulative percent of business against the cumulative percent of stock numbers responsible for that business. For example, 20.6 percent of the active NAVELEX managed items accounted for 88.5 percent of the total transactions experienced during the three year period. This

20.6 percent figure resulted from a selection of those items with a total business frequency of 20 or more transactions. The maldistribution curve also illustrates that those items with one or less transactions represent 36 percent of the stock numbers and only one percent of the total business.

Tables 2,3, and 4 of Appendix H present the total frequency distributions of PPR business, unplanned business, and CASREPT business, respectively. The format is the same as that presented in Table 1.

Tables 5,6, and 7 of Appendix H also use the same format as that used in Table 1. These tables, however, concentrate on the 198 stock numbers which represent 20.6 percent of the total active items and 88.5 percent of the business as illustrated in Graph 1 of Appendix H. Table 6 illustrates the unplanned business with a frequency of 20 or greater. Table 5 presents the PPR business of the same stock numbers, but one particular point stands out: 59 of the 198 stock numbers experienced no PPR transactions. Table 7 further summarizes these 59 stock numbers by displaying the frequency distribution of number of unplanned transactions and the number of stock numbers which experienced that number of transactions.

VI. DISCUSSION AND CONCLUSIONS

A. PLANNED REQUIREMENTS AND BUDGETING

It should be evident from the results section above, presenting information on the PPR file, that SPCC has a satisfactorily designed program to handle planned requirements. This PPR program is designed to accomodate the planned program type of item which is currently being procured for NAVELEX management.

NAVELEX should utilize the "Deferred Requisition" procedure in order to reduce the workload and management attention normally required with the standard PPR input routine.

A major benefit from using the PPR program is that the current problem of defining the terms "end item", "primary item" and "secondary item" is avoided because the program does not require differentiation between types of items.

The current NAVELEX budget process for 2Z items complements the utilization of PPR's as a management tool. A P-1 budget line item for NAVELEX can contain items which are supported by more than one sponsor. In contrast, SPCC submits budget requirements for 4G items to only one sponsor with NAVELEX providing justification. Due to the complexities associated with obtaining item funding for program requirements, program managers at NAVELEX should continue to develop budget submissions in the same manner as is being performed currently and then provide requirements funding to SPCC utilizing the PPR program procedures for all program material transferred to SPCC management.

B. REPAIRABLES

When considering the pros and cons associated with managing material at the Hardware Systems Command versus the Inventory Control Point, Repairables management at the ICP should be considered as a positive benefit. Programs at SPCC are adequately designed to support items of the type currently managed by NAVELEX. These programs are supported by the UICP forecasting models and consequently would enable the development of reasonable demand approximations for the majority of items experiencing unplanned demands. This should result in a decrease in repair funding shortfalls and consequently improve material availability on those items which migrate to SPCC management.

C. DISPOSAL PROCEDURES

NAVELEX is the responsible engineering activity for 4G electronics material; therefore, it has the final say in confirming or refuting any recommendation made by SPCC for disposal of an item. Such recommendations would only be made by SPCC after an elaborate screening procedure described in the results section above. Thus, NAVELEX would not be required to enter the process until many other screens had been carried out.

D. DATA ANALYSIS

The data analysis results lend support to the premise that HSC's should manage minimal amounts of material. SPCC inventory management programs are designed to support the bulk of material reviewed during the data analysis phase.

NAVELEX is currently managing a significant amount of material which is experiencing little or no demand.

Analysis of the CENILE tape revealed only 960 items that experienced any demand during the last ten years out of a total of 1948 items managed by NAVELEX at the end of 1977. Appendix G, Table 1 further illustrates that 144 of these 960 items experienced no activity in the last three years. In addition, Appendix I, Graph 1 shows that 346 (36 percent) of these 960 items experienced less than two demands during the same period.

Items managed by NAVELEX which experience little or no activity should be seriously considered for withdrawal of interest or transfer to SPCC, unless they are new items and have not reached stability in design. There are two primary reasons for transferring these items. First of all, NAVSUP retains the primary responsibility as inventory manager of Navy supply material. Secondly, this is an excellent opportunity for NAVELEX to remove items from the records which are only retained as safety stock and move them to SPCC management where the only monitoring necessary can be accomplished by an automated routine. Strong emphasis should be placed on disposing of as much of this material as possible in order to avoid tying up budget dollars at SPCC and to avoid incurring other costs such as warehousing.

Many of the active items managed by NAVELEX experienced unplanned demands as illustrated in Appendix H, Table 3. These items can be managed more effectively under SPCC's current UICP programs which have been designed specifically for such business. Although CASREPT's represent a small portion of NAVELEX's total business (as illustrated in Appendix H, Table 4), CASREPT's are unplanned demands and, as such, they should also receive the benefits of the UICP forecasting techniques. In addition, these items can continue to receive the necessary command attention by NAVELEX through the CASREPT reporting procedures, even if transferred to SPCC.

E. RETENTION CRITERIA

1. Engineering Stability

One of the most subjective problem areas of stock coordination is identifying when diminishing engineering/technical control has reached the point where an SPCC inventory manager can assume primary management responsibility for the item. Two of the four justification criteria for HSC inventory retention, Criteria Two and Three (see pages 12 and 13), use terminology which allows individual judgements to enter the decision process when assigning the criteria . All the commands involved in stock coordination are aware of the benefits to be derived from quantifying these criteria, but of the many individuals contacted, one underlying belief dominated: Engineering instability which is designated as being "highly subject to design change" and subject to "a high degree of engineering judgement ... concerning design or relationships to a system" is open to interpretation by whomever wants to define the terms and for whatever purpose they desire.

Attempts have been made in the past to quantify "engineering stability." One such attempt by NAVSUP suggested criteria which might quantify instability such as the existence of outstanding Engineering Change Proposals (ECP's), whether any problems were encountered during the last procurement, whether all military specifications are available, or whether any major design changes are in development.

One of the reasons why NAVSUP's effort was relatively unsuccessful is that problems exist even within the definitions of these indicators. For example, the status of an ECP for any given item is not easily visible as it is processed through the NAVELEX organization. The significance of the change created by an ECP also requires a configuration control decision which may be subject itself

to a certain amount of individual judgement. Identifying problems encountered during the last procurement is likewise, not necessarily a usable indicator. In many instances the initial buy of material for a project is for large quantities to cover all known future planned requirements. By the time unplanned demands create further requirements above the initial purchase quantity, the equipment specifications may have changed considerably. The availability of military specifications is susceptible to similar problems since these equipment changes and alterations occur constantly. The paperwork process of maintaining current specifications will often lag behind the changes. Finally, using the existence of a major design change as the criterion for retaining an item at the HSC presents a different kind of problem. Many new types of equipment are always in the research and development stages and are designed to replace or modify existing equipments. This is a continual process, so to use this as a criterion would qualify most existing equipments for retention.

Configuration control is the term used for monitoring and controlling design changes and new equipment developments. At some point the marginal utility of an equipment alteration or replacement will be less than the cost of that change. The current cutoff point and current configuration control practices may be one area of investigation for possible development of a quantifiable engineering stability criterion.

Before a new item can be introduced for fleet use, it must pass certain standard testing procedures such as an operational specification test, first article test, or a pre-production test. Successful completion of one or all of these tests may be one indicator of engineering stability.

NAVELEX monitors fleet support and receives indicators of potential or actual problems with electronic systems through many reports received at headquarters. These reports relate to fleet CASREPT's, maintenance, and

other areas, any of which may be used as possible indicators of engineering instability.

In addition to those mentioned above, there are other indicators of design instability. One such indicator relates to the amount of involvement required by a Field Maintenance Agent (FMA) with a particular equipment. FMA's are NAVELEX field activities responsible for providing maintenance and supply support directly to the operating forces by providing technical and managerial assistance on those equipments directed by NAVELEX. The various functions performed by an FMA can by broken down into six categories:

1. Maintenance management.
2. Systems performance evaluation.
3. Maintenance documentation support.
4. Configuration management.
5. Depot level repair support.
6. Technical assistance.[16][17]

Perhaps education of the engineers as to the problems of managing inventories once an item is introduced to the fleet and the capabilities that SPCC has available, would make considerable progress towards clarifying the trade-off between design instability and the problems faced by NAVELEX in managing inventories.

2. Family Relationships

One subject area which has not been used in the past as a criterion for identifying items as candidates for the transfer of the inventory management function is how that item relates to other items in terms of substitutability or interchangeability. A "family" of related items is defined by SPCC as a collection "of items that share common applications in higher assemblies, end items, or weapons systems "[18]. "Common application" is used to mean that the items may be substituted for one another in some degree.

The primary benefit to be derived from managing an

inventory under the "family" concept is the consolidation of inventory management functions and the elimination of duplication. This, it should be noted, is also the purpose of stock coordination, but there is no current record or file which cross references the family relationship of a NAVELEX 2Z cognizance item to an SPCC 4G or other cognizance item. Except for coding established within individual commands, this condition exists for all Navy managed items.

SPCC is currently managing families of items under what is called an "alternate NIIN" relationship. A NIIN is a National Item Identification Number (NIIN) used in identifying items in the National supply system. The key to family assignments is the identification of family relationships.Once the relationships are identified, the proper code can be entered on the MDF by qualified technical personnel. In order to give an appreciation for the different relationships, the coding scheme is provided in Appendix J.

Other criteria have also been added to the family selection process at SPCC. For example, members of a family must also be either all repairable or all consumable and must have the same unit of issue and item manager. Additionally,

> for program-related applications, all members of a family must be program-related and , for non-program-related applications, all members of a family must be non-program-related.[17]

Once a family of items is established and possibly subdivided into groups, the items are collected in a manner which allows consolidation of demand forecasts which leads to economic reorder levels and order quantities. It also allows consolidation of assets and requirements during the processes of SDR, Repairables routines, Stratification, and Disposal.

Management of different items within the same family by

both NAVELEX and SPCC results in problems because demands recorded at either NAVELEX or SPCC are not interfaced with the other members of the family at the other activity. For example, most requests for 2Z cog NAVELEX material are transmitted via SPCC, but the requisition is not reviewed or utilized in any manner by SPCC during the transmittal process. This problem is being reviewed at the DOD level, but as the system currently exists, many dollars are undoubtedly wasted in buying or repairing material at either SPCC or NAVELEX when the other activity has stock of a substitutable item ready for issue. The possible excess quantities resulting from this duplication may also be causing extra warehousing costs or other holding costs.

The complexities involved in managing and monitoring the interchangeability and substitutability of primary equipments is magnified many times in tracking the component parts of the primary equipments. Modifications, redesigns, replacements, or other such changes to the primary item may cause any number of changes in the support requirements for the existing components. For example, a system wide primary equipment modification may increase requirements for one component and possibly delete all requirements for another. Primary equipment modifications are quite likely to alter the mix of component support required. Increases or decreases in the numbers of primary equipments in use in the Navy can also significantly affect the demand patterns for the repair parts support related to these items.

It is obvious that the optimal situation would have all items of a family managed by the same IM. However, the question of when to transfer an item which is still subject to some degree of engineering control remains as a hurdle to keeping all members of a family within the same command. Many times it is difficult to identify when technical control should stop and standard inventory procedures should take over.

The primary problem associated with inventory

management by families is in initially identifying the item with a particular family. Currently no single source of reference exists within the Department of Defense or, as mentioned previously, even within the Navy, which lists all items in accordance with family relationships. However, a major undertaking has been initiated in this area.

In two memorandums dated 19 May and 5 October 1976 the Assistant Secretary of Defense for Installations and Logistics(ASDI&L) directed the Joint Logistics Commanders(JLC) to task the Joint Policy Coordinating Group for Defense Integrated Material Management(JPCG/DIMM) to develop procedures which will provide the capability of consolidating Interchangeable and Substitutable(I&S) material data for all DOD items, with particular emphasis on "nonconsumables." As a result of this direction, an Interchangeable and Substitutable Item Subgroup(ISIS) has been formed whose purpose is to "Identify procedures and additional systems capabilities required to insure an adequate, uniform, Interchangeable and Substitutable (I&S) Item System in the DOD to accommodate interservice exchange and establish a single manager for each I&S family"[19]. A successful effort in this area could provide significant improvement over current methods of substitutability screening such as the SCAT coding used at NAVELEX.

In the near future at least, whenever a new item or modification of an existing item is developed and introduced by NAVELEX for use by Navy customers, it is imperative that the IM at SPCC responsible for the related family be made aware of the new item's availability. Alsc very important to that IM is how the new item relates to the other items in the family.

If the item is accepted throughout the Navy with few engineering problems and is being substituted for items managed at SPCC, the new item can affect demand patterns, repair and buy quantities, quantities turned-in for exchange of the new item, and potential disposal quantities. If the

new item is superior to the older equipment and becomes the "preferred" item, it can significantly affect all the inventory characteristics of the older item(s), specifically creating long supply of lesser desireables. Therefore, as soon as is possible, the item should be migrated to SPCC. The end result should be an effective, efficient, and economical inventory management procedure since inventory management of all items within the same family/group at one command significantly reduces the possibility of duplicated efforts and wasted resources.

F. GENERAL DISCUSSION

The initial goal of this thesis was to develop a set of criteria or guidelines to assist NAVELEX in identifying candidates for transfer from NAVELEX management to SPCC management. Although research did not reach this goal, what is provided is the first phase toward this accomplishment. Sufficient groundwork has been established from the findings to allow a continued and expanded search for the identifying criteria.

Irrespective of the above, the process of transferring the bulk of the current NAVELEX inventory to SPCC inventory management is well underway. The degree of success in accomplishing a smooth transfer which includes identifying when to transfer items, continuing the process, improving communication between commands, and avoiding the creation of larger problems which might be caused by the transfer, will be watched very closely by NAVSUP and NAVMAT.

A successful bulk transfer by NAVELEX will not only satisfy the requirements of the existing NAVMAT directives, but it may also suggest guidelines for perhaps even larger transfers from the other HSC's to the ICP's. If any inventory management problems arise from the transfer and are solved jointly between NAVELEX and SPCC, the possibility

exists for major changes in Navy Stock Coordination policy. In fact, NAVMAT is currently developing a new set of retention criteria for the HSC's and is requesting information from current stock migration participants.

Caution is still an important watchword in approaching a new stock coordination policy, particularly with respect to transferring a significant number of items at one time. Items which have had special procedures established for managing them because of manual processing must be collected and reviewed for possible cancellation of the procedures or continuation in some form. The review will be complicated in proportion to the number of people who have been involved in managing the item throughout the NAVELEX organization. All possible contingencies should be given consideration.

There were no significant historical or procedural findings to indicate that a major transfer such as the one in process at NAVELEX should fail. This is not to say that the unexpected will not cause extraordinary problems. Communication problems exist within and between commands. Some people are concerned about the supply system being unresponsive to the project managers. Others are worried about losing their jobs, particularly the NAVELEX IM's who are faced with a possible massive stock transfer which not only would remove the items for which they are responsible but would also cause them to fill out the many stock transfer forms themselves.

VII. RECOMMENDATIONS

In conjunction with the current Naval Electronic Systems Command effort to transfer as many items under their management as possible to the Ships Parts Control Center, Mechanicsburg, Pennsysvania, the following recommendations are made:

1. Items managed by the Naval Electronic Systems Command which experience little or no activity should be withdrawn from interest or transferred to the Ships Parts Control Center unless they are new items and have not reached stability in design.

2. Items managed by the Naval Electronic Systems Command which experience unplanned demands should be transferred to Ships Parts Control Center management as soon as feasible in order to take economic advantage of existing Repairable management programs.

3. Any item under Naval Electronic Systems Command management which can be identified as a nearly stable member of a family/group of items which are managed at the Ships Parts Control Center (SPCC) should be transferred to SPCC.

4. The Planned Program Requirements program at the Ships Parts Control Center should be well understood by the Naval Electronic Systems Command so that the command can make the best possible utilization of the program.

5. Budget submissions and justifications should not change.

6. The Planned Program Requirements program and data file of the Ships Part Control Center should be used to trigger the forwarding of funding for program items from the Naval Electronic Systems Command to the Ships Parts Control Center.

7. The Ships Parts Control Center should use the demand

data available on the Consolidated End Item Ledger (CENILE) as a source of demand data history in forecasting future demand of items transferred from Naval Electronic Systems Command management. Such information should not be requested from the transferring command at the time of transfer.

8. High priority requisitions should not override Planned Program Requirements unless it has been approved by the responsible engineering command. This will eliminate unauthorized use of resources by ineligible customers.

9. Further research in the area of establishing criteria for transferring material from a Hardware Systems Command to an Inventory Control Point should be conducted using this thesis as the groundwork for such a study.

APPENDIX A

INITIAL STOCK COORDINATION PRINCIPLES AND POLICIES

1. An inventory manager can by responsive to more than one technical bureau.

2. When inventory control for an equipment is vested in a supply demand control point, the inventory control of the supporting peculiar repair parts will be vested in the same supply demand control point.

3. Supply management of each line item or group of similar items will be exercised by a single inventory control point to the maximum practicable degree.

4. Supply management responsibility for specific categories of items will, to the maximum degree practicable, be consolidated in a single supply demand control point. In this connection, individual items of a functional type (such as drills, screwdrivers, and wrenches) or individual items (such as nuts, bolts, switches, resistors, capacitors, washers, paints, and chemicals) which are not keyed by design or other unique characteristic to a specific equipment and which fall within or extend a range, group, or category of items, normally managed by a single supply demand control point, will be transferred or assigned to that supply demand control point irrespective of the use or application of the item as it relates to the several Navy programs.

5. An identical item of material may, after proper review, be allocated to the supply management of more than one supply demand control point, provided it is demonstrated

that it will affect adversely the efficiency of the Navy Supply Systsem if allocated to a single supply demand control point. A single stock number will be used tc the maximum practicable degree to identify each of the items duplicated.

6. Inventory control of material required by the Navy will be vested in supply demand control points as distinguished from the managers of the technical bureaus, subject to the following exceptions: equipments or items which by design, use, cost, or other unique features, require direct control by the technical bureau; or technical bureaus may, as appropriate, designate a supply demand control point as the inventory manager for such equipment or item, retaining in the bureau direct control of purchase, issue, or disposal of items considered to require such control.

7. If practicable, one supply demand control point will control material furnished by a given segment of industry. This is a qualified principle and is not susceptible to comprehensive application.[6]

APPENDIX B

CURRENT STOCK COORDINATION PRINCIPLES AND POLICIES

1. An inventory manager can be responsible tc more than one bureau, command, or office.

2. The same inventory manager may manage simultaneously certain items under the Navy Stock Account and other items under the Appropriation Purchases Account.

3. When inventory control for an equipment is vested in a Naval Supply Systems Command inventory ccntrol point, the inventory control of the supporting peculiar repair parts will be vested in the same Naval Supply Systems Command inventory control point.

4. A Naval Supply Systems Command inventory control point may be assigned program support for an equipment or supply support for repair parts or both.

5. Naval programs and operating activities may be supported by more than one Naval Supply Systems Ccmmand inventory control pcint.

6. One Naval Supply Systems Command inventory control point may manage both "common" and "peculiar" material.

7. Material cognizance will not be transferred to a Naval Supply Systems Command inventory control point when an item or groups of items have been identified for possible withdrawal of user interest in the Defense Logistics Services Center records in accordance with the provisions of the Defense Inactive Item Program.

8. An item of supply will not be stocked in more than one stores account.

9. Supply management of each line item or group of similar items will be exercised by a single inventory control point to the maximum practicable degree.

10. Supply management responsibility for specific categories or subcategories of items will, to the maximum degree practicable, be consolidated in a single Naval Supply Systems Command inventory control point. In this connection, individual items of a functional type (such as drills, screwdrivers, and wrenches) or individual items (such as nuts, bolts, switches, resistors, capacitors, washers, paints, and chemicals) which are not keyed by design or other unique characteristic to a specific equipment and which fall within or extend a range, group, or category of items normally managed by a single Naval Supply Systems Command inventory control point, will be transferred or assigned to that Naval Supply Systems Command inventory control point irrespective of the use or application of the item as it relates to the several Navy programs.

11. Each item of material, whether for military or industrial use within the Navy and regardless of the manner of requisition, will be under the cognizance of only one inventory manager. All national stock numbered items used by the Navy will be considered as items of supply and will be managed by a Naval Supply Systems Command inventory control point unless otherwise excluded by the Chief of Naval Material.

12. Transfers of material cognizance between Naval Supply Systems Command inventory control points may be accomplished by mutual consent of the losing and gaining inventory control point and approval by the Naval Supply Systems Command.

13. Transfer of items related to equipments and subassemblies will not be approved, generally, unless the recommended gaining inventory control point can be furnished with identification of end items which the part supports and other planning data necessary to assure continuity of support.

14. The assignment of material cognizance normally includes assignment of responsibilities and exercise of all phases of supply management. Under certain circumstances, selected supply management functions may be delegated to Naval Supply Systems Command inventory control points for items retained for inventory management by a bureau, command, or office.

15. Reassignment of material cognizance to Naval Supply Systems Command inventory control points must be phased to insure a minimum of disruption to supply support.

16. Cognizance of major items of equipment is transferable between the inventory managers of the bureaus, commands, or offices.

17. Inventory control of material required by the Navy will be vested in Naval Supply Systems Command inventory control points as distinguished from the inventory managers of the bureaus, commands, or offices, subject to the following exceptions: equipments or items which, by design, use, cost, or other unique features, require direct control by the bureau, command, or office; or bureau, command, or office may, as appropriate, designate a Naval Supply Systems Command inventory control point as the inventory manager for such equipment or item, retaining in the bureau, command, or office direct control of purchase, issue, and disposal of items considered to require such control.

18. A bureau, command, or office inventory manager may, as appropriate, designate a Naval Supply Systems Command inventory control point as the inventory manager of items

excluded under item 17, retaining in the bureau, command, or offfice direct control of purchase, issue, and disposal of items considered to require such control.

19. Naval inventory management functions for material obtained from another service either by item management coding or by Military Interdepartmental Purchase Request (MIPR) will be the responsibility of a Naval Supply Systems Command inventory control point.

20. The transfer of supply management functions from a bureau, command, or office to a Naval Supply Systems Command inventory control point does not abrogate the sponsoring command's technical item control and Navy design control agent responsibilities.

21. Optimum utilization will be made of material in all segments of the military supply system prior tc new procurement.

22. When a program support Naval Supply Systems Command inventory control point is obtaining supply support from another Naval Supply Systems Command inventory control point for technical items, the program support inventory ccntrol point will provide to the supply supporting inventory control point the technical information covering the application of that item to the degree that such information is required. The supply supporting Naval Supply Systems Command inventory control point will insure that this technical information is utilized in supply determinations.

23. All requests for reverse migration transfers from a Naval Supply Systems Command inventory contrcl point to a bureau, command, or office for inventory management will be forwarded to the Naval Supply Systems Command Headquarters with supporting rationale for resolution and approval.

24.Personnel transfers are not a prerequisite to the item transfers under stock coordination actions; however, each

case will be considered on its own merits. Items or functional transfers which alter the scope of management actions of the transferring organization on a continuing basis will include provisions for transfer of personnel or other resources equivalent to the reduced man-hours of effort in the transferring organization. Resource requirements of the Naval Supply Systems Command inventory control points which are higher than those previously provided by the transferring activity will be incorporated in a Program Change Request (PCR) by the gaining inventory control point for the earliest fiscal year possible.Losing and gaining inventory managers must coordinate with each other in support of items or functions being transferred.[6]

APPENDIX C

CENILE RECORD LAYOUT

DATA ELEMENT	DISCRIPTION
1-3	DOCUMENT IDENTIFIER
4-6	BLANK
7	MEDIAN/STATUS CODE
8-11	FEDERAL SUPPLY CLASS
12-20	NATIONAL ITEM IDENTIFICATION NUMBER (NIIN)
21-22	SPECIAL MATERIAL IDENTIFICATION CODE
23-24	UNIT OF ISSUE
25-29	QUANTITY
30-43	DOCUMENT NUMBER
44	SUFFIX CODE
45-50	SUPPLEMENTARY ADDRESS
51	SIGNAL CODE
52-53	FUND CODE
54	DISTRIBUTION CODE
55-56	COGNIZANCE CODE
57-59	PROJECT CODE
60-61	PRIORITY
62-64	REQUIRED DELIVERY DATE
65-66	ADVICE CODE
67-69	ACTIVITY ROUTING INDICATOR
70	PURPOSE CODE
71	CONDITION CODE
72	MANAGEMENT CODE
73-75	TRANSACTION DATE
76	MATERIAL CONTROL CODE
77-78	BLANK

DATA ELEMENT	DISCRIPTION
79-80	ACTIVITY SEQUENCE CODE
81-84	ERROR CODES
85-88	BLANK
89-90	PROCESS YEAR
91-95	LOCAL ROUTING CODE
96	BLANK
97-105	ORIGINAL TRANSACTION NIIN
106-115	REPAIRABLE ITEM MODEL CODE
116-140	EQUIPMENT NAME
141	ITEM MANAGEMENT CODE
142	BLANK
143-145	RECORD ESTABLISH DAY
146-150	BLANK

The following is an example of an entire record contained on the CENILE tape. Three lines were needed to show it here. Each line contains 50 data elements; spaces indicate that the particular data element was blank on this record:

```
A4R    5865000011582  EA00001N6279331521456 N00189
B30 2ZEQ807200  NNZAAR166Z            73XB200
                FC-3/WLA-3A                193
```

APPENDIX D

CENILE RECORD SCREENING PROCEDURE

In order to classify the demand data on the CENILE tape, the following screening hierarchy was followed:

(1) All documents citing DIC's 105, A4R, A6, ABV, DAC, DAD, DGA, DZA, D4, D6, D8, and D9 were purged from the CENILE tape.

(2) Documents with document identifiers of 100 were matched with either 101 or 102 documents by quantity and requisition number. Matched documents were deleted. Those DIC 100 documents with quantities less than the 101 or 102 DIC documents were considered as partial cancellations and were adjusted accordingly.

(3) Documents with a DIC of AC were matched to either A0, A3, A4, or A5 documents by requisition number with matching documents deleted.

(4) All remaining unmatched 100 and AC documents were deleted.

(5) Using the sequence below, the first document identifier encountered for a given requisition number was retained deleting all others with the same requisition number: 102, 101, A0, A3, A4, A5, and D7.

Those documents remaining were screened further to classify them into the various types of demand.

(1) Documents were divided up into "afloat" or "ashore" by screening the service code for "V" or "R", both of which correspond to an afloat requirement. Ashore requirements were determined by failing this test. These ashore items were further broken down into categories of unplanned and PPR demands.

(3) Casrepts were determined by screening afloat documents against the following:

A. Documents with "G" or "W" in the first position of the serial number, or

B. Those documents with a project code of 706,707,756,757, or XB1, or

C. Those documents with a "K" in the second position of the project code and a "0" in the third position.

(4) if the document was coded afloat but was not a CASREPT or a planned requirement then it was considered unplanned afloat.

APPENDIX E

DEMAND TABLEAU SAMPLES

NIIN: 001341305 NOMENCLATURE: MT-4667/U

	1975				1976				1977			
QTR	1	2	3	4	1	2	3	4	1	2	3	4
CASREPTS	0	0	0	0	2	0	0	0	0	0	0	0
UNPLANNED (AFLOAT)	0	1	4	0	1	2	2	1	4	2	1	0
UNPLANNED (OTHER)	8	39	32	3	6	12	5	7	3	1	1	0
PPR (AFLOAT)	0	0	0	0	0	0	0	0	0	0	0	0
PPR (OTHER)	1	179	114	108	10	63	0	0	11	7	12	1
TOTAL	9	219	150	111	19	77	7	8	18	10	14	1

TOTAL BUSINESS 75,76,77= 643

NIIN:001395810 NOMENCLATURE: DT-526/Pd

	1975				1976				1977			
QTR	1	2	3	4	1	2	3	4	1	2	3	4
CASREPTS	0	0	0	0	0	0	1	1	0	2	2	0
UNPLANNED (AFLOAT)	1	9	22	4	17	20	34	12	25	24	25	0
UNPLANNED (OTHER)	2	15	76	10	76	47	96	1	17	39	34	0
PPR (AFLOAT)	0	0	0	0	0	0	0	0	0	0	0	0
PPR (OTHER)	0	1	0	0	0	6	2	0	5	0	3	0
TOTAL	3	25	98	14	93	73	133	14	47	65	64	0

TOTAL BUSINESS 75,76,77 = 629

NIIN:004705364 NOMENCLATURE: AS-1777B/UPX

	1975				1976				1977			
QTR	1	2	3	4	1	2	3	4	1	2	3	4
CASREPTS	0	0	0	0	2	0	3	0	0	4	0	0
UNPLANNED (AFLOAT)	1	6	8	2	4	5	6	1	8	10	4	0
UNPLANNED (OTHER)	30	45	20	9	10	25	13	2	33	5	5	0
PPR (AFLOAT)	0	0	0	0	0	0	0	0	0	0	0	0
PPR (OTHER)	40	66	21	84	4	53	7	1	94	21	34	4
TOTAL	71	117	49	95	20	83	29	4	135	40	43	4

TOTAL BUSINESS 75,76,77= 690

NIIN:009649673 NOMENCLATURE: CU-937/UR

	1975				1976				1977			
QTR	1	2	3	4	1	2	3	4	1	2	3	4
CASREPTS	7	8	14	4	19	9	18	9	21	10	7	0
UNPLANNED (AFLOAT)	19	19	34	2	32	34	71	9	54	28	24	0
UNPLANNED (OTHER)	19	23	25	4	8	10	17	5	17	14	11	0
PPR (AFLOAT)	0	0	0	0	0	0	0	0	0	0	0	0
PPR (OTHER)	0	0	12	8	10	7	0	0	4	0	9	0
TOTAL	45	50	85	18	69	60	106	23	96	52	51	0

TOTAL BUSINESS 75,76,77 = 655

13. Transfer of items related to equipments and subassemblies will not be approved, generally, unless the recommended gaining inventory control point can be furnished with identification of end items which the part supports and other planning data necessary to assure continuity of support.

14. The assignment of material cognizance normally includes assignment of responsibilities and exercise of all phases of supply management. Under certain circumstances, selected supply management functions may be delegated to Naval Supply Systems Command inventory control points for items retained for inventory management by a bureau, command, or office.

15. Reassignment of material cognizance to Naval Supply Systems Command inventory control points must be phased to insure a minimum of disruption to supply support.

16. Cognizance of major items of equipment is transferable between the inventory managers of the bureaus, commands, or offices.

17. Inventory control of material required by the Navy will be vested in Naval Supply Systems Command inventory control points as distinguished from the inventory managers of the bureaus, commands, or offices, subject to the following exceptions: equipments or items which, by design, use, cost, or other unique features, require direct control by the bureau, command, or office; or bureau, command, or office may, as appropriate, designate a Naval Supply Systems Command inventory control point as the inventory manager for such equipment or item, retaining in the bureau, command, or office direct control of purchase, issue, and disposal of items considered to require such control.

18. A bureau, command, or office inventory manager may, as appropriate, designate a Naval Supply Systems Command inventory control point as the inventory manager of items

APPENDIX F

GENERAL FLOW CHART OF NAVY CUSTOMER PPR WITH RDD

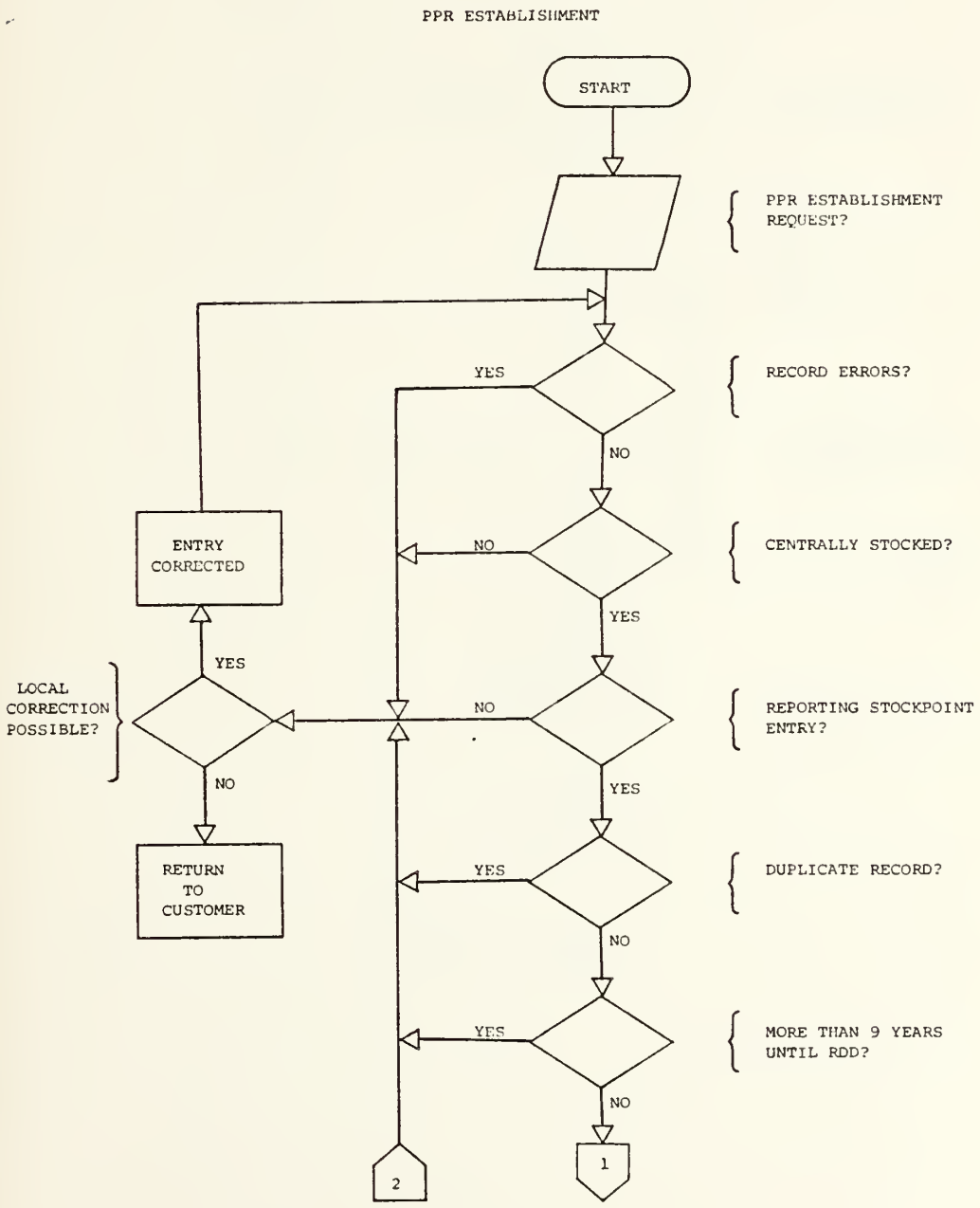


FIGURE 1

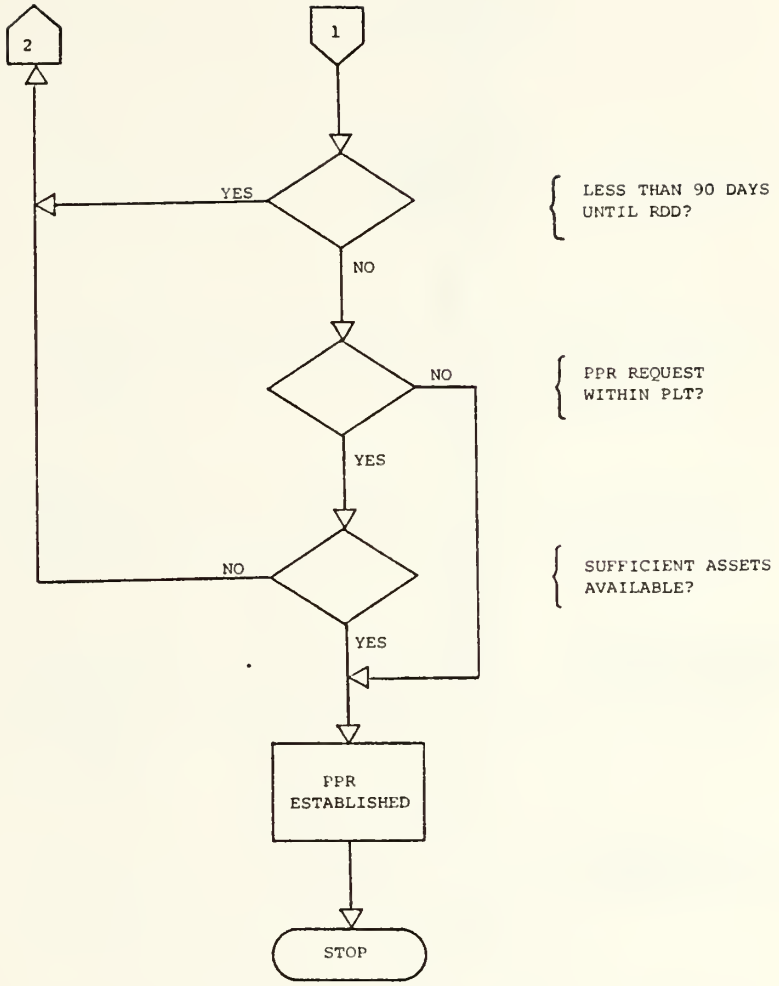


FIGURE 1 (CONTINUED)

PPR CHANGES BEFORE CONFIRMATION

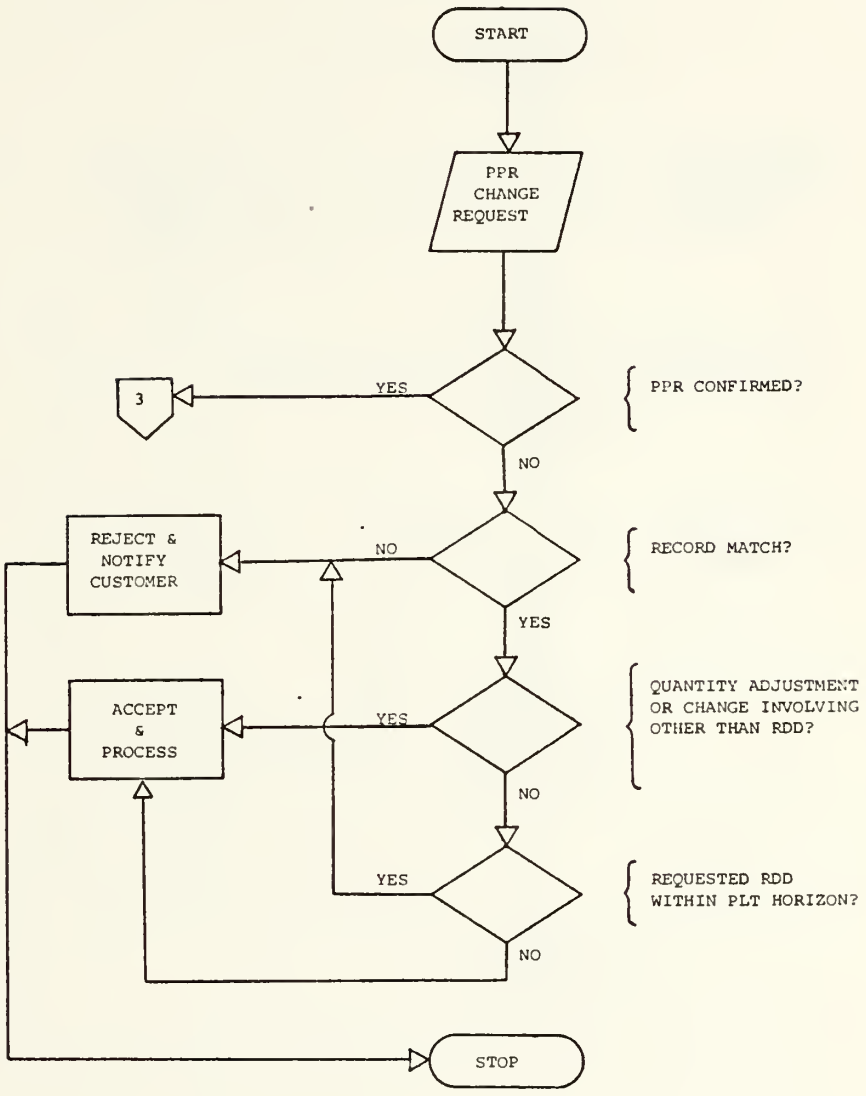


FIGURE 2

PPR CONFIRMATION PROCESS

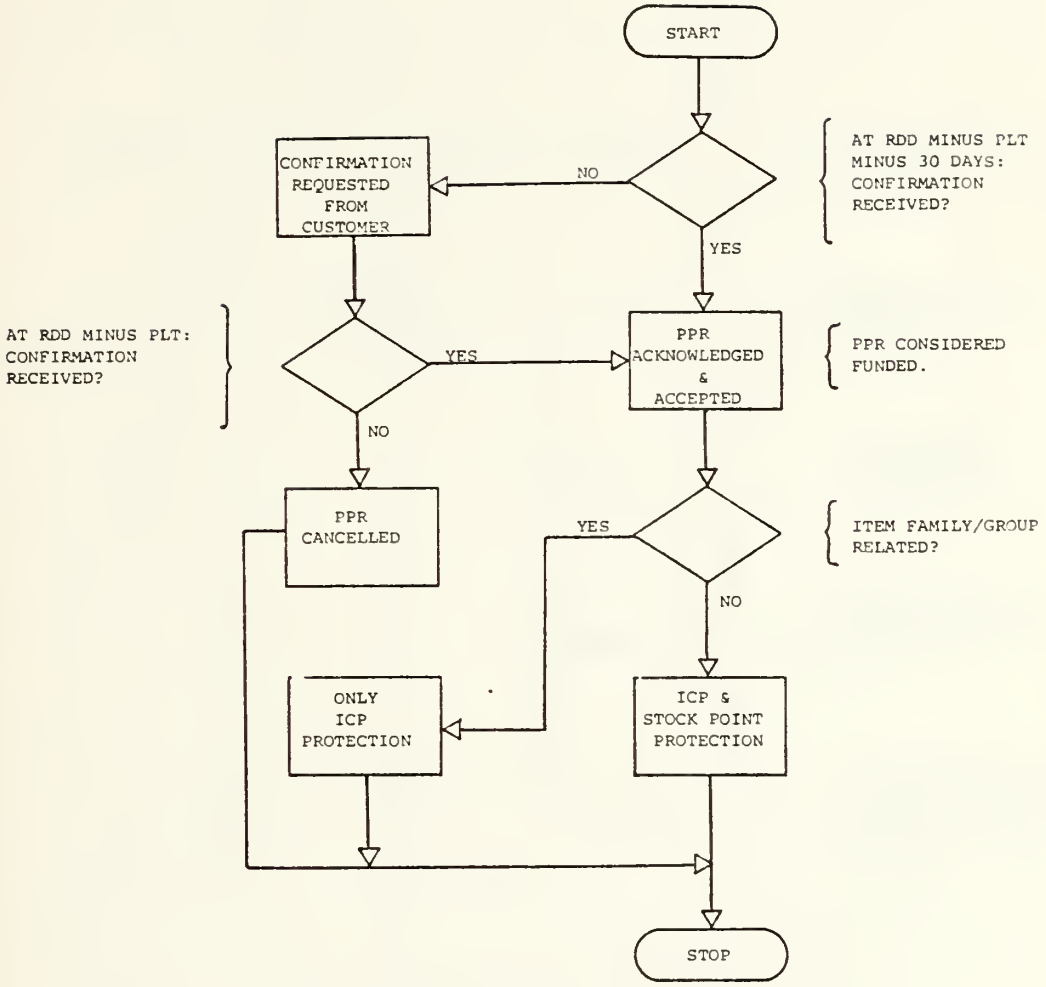


FIGURE 3

PPR CHANGES AFTER CONFIRMATION

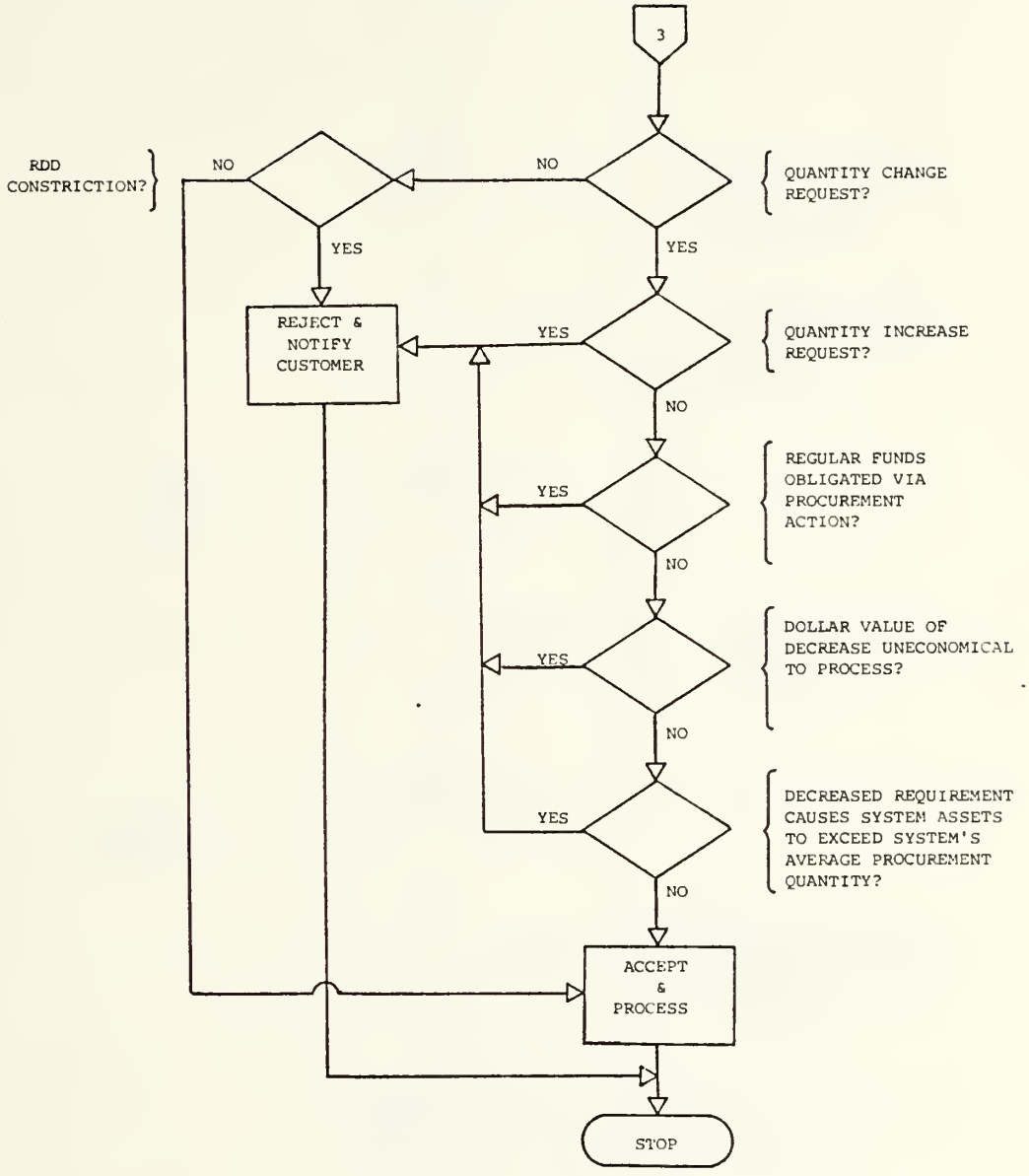


FIGURE 4

PPR RECORD TERMINATION

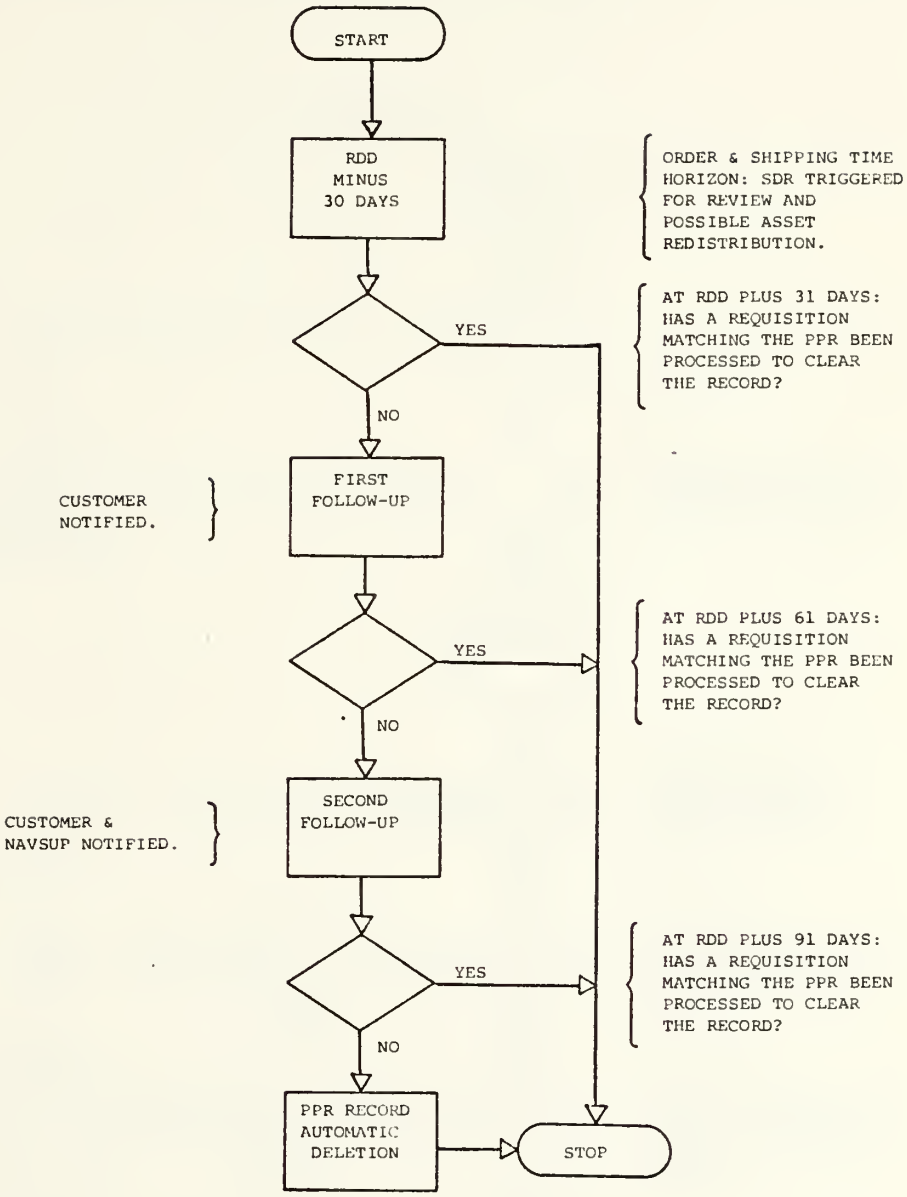


FIGURE 5

APPENDIX G

GENERAL FLOW CHART OF INTERNALLY GENERATED PPR WITH RDD

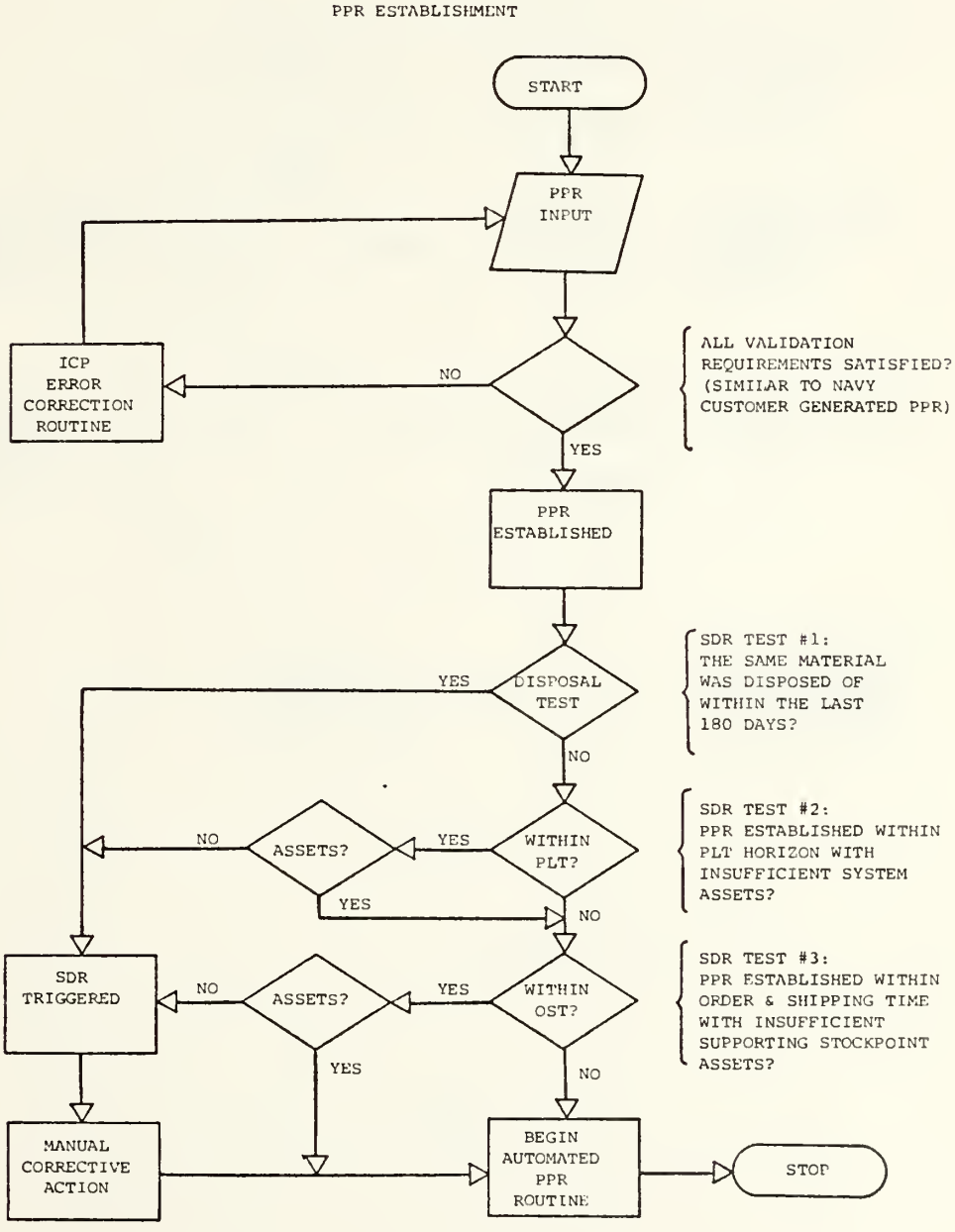


FIGURE 6

PPR RECORD TERMINATION

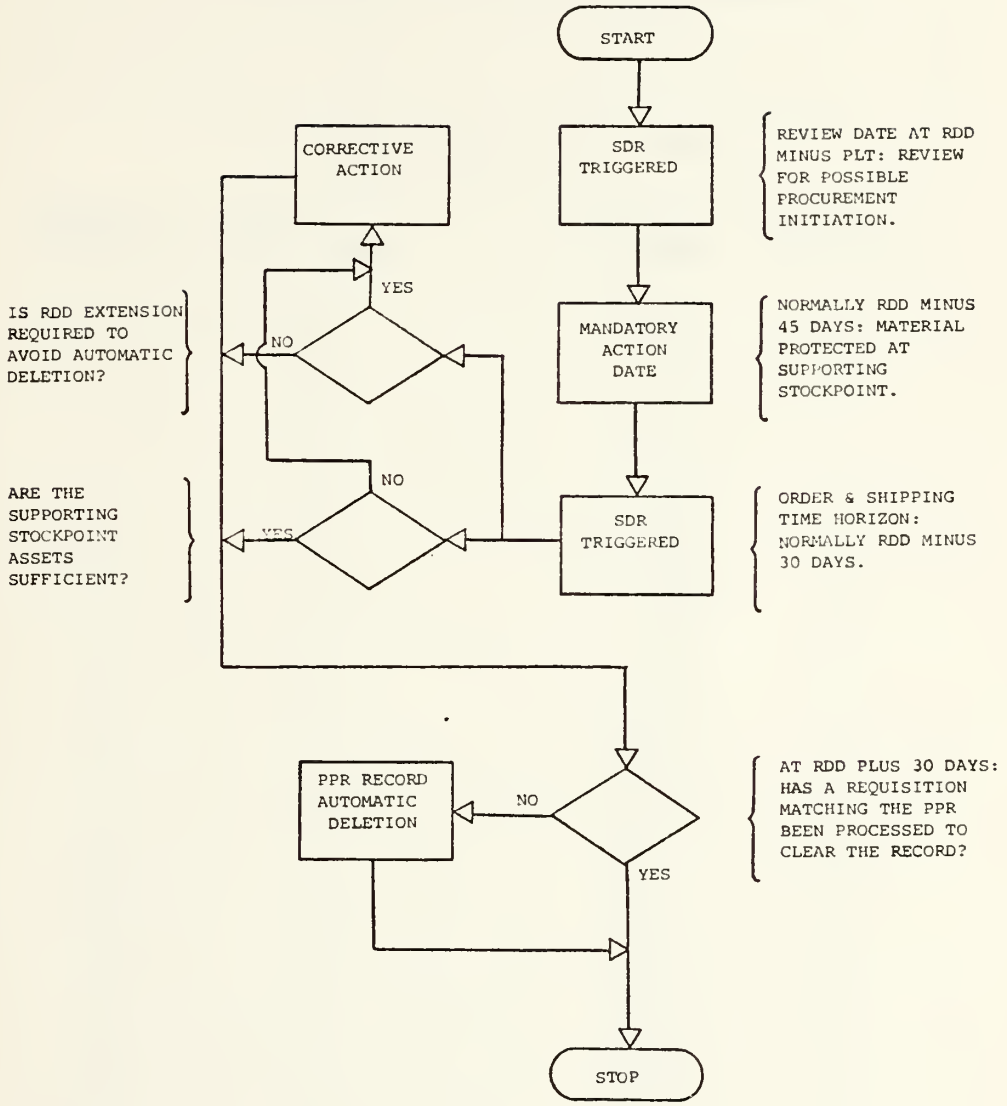


FIGURE 7

APPENDIX H

FREQUENCY DISTRIBUTION TABLES

TOTAL BUSINESS FREQUENCY DISTRIBUTION

NUMBER OF TRANSACTIONS	NUMBER OF STOCK NUMBERS	NUMBER OF TRANSACTIONS	NUMBER OF STOCK NUMBERS
0	144	55	3
1	202	56	1
2	89	57	2
3	66	58	1
4	37	59	1
5	32	61	1
6	26	62	1
7	29	64	1
8	17	65	2
9	15	66	2
10	14	70	1
11	13	71	1
12	14	72	1
13	7	73	1
14	8	77	2
15	8	79	1
16	9	80	1
17	14	81	2
18	10	85	1
19	8	94	5
20	5	96	1
21	9	100	2
22	10	105	1
23	3	108	1
24	4	110	2
25	3	113	1
26	3	114	1
27	3	115	1
28	3	119	1
29	3	121	1
30	1	125	1
31	3	129	1
32	2	130	2
33	3	131	1
34	1	132	1
35	4	133	1
36	2	135	1
37	4	139	1
38	2	153	1
40	4	154	1
43	1	156	1
41	1	158	2
45	1	160	2
46	1	162	1
47	4	166	1
48	3	174	1
49	4	186	1
50	1	196	1
51	1	205	1
52	3	207	1
54	1	212	1

TABLE 1

NUMBER OF TRANSACTIONS	NUMBER OF STOCK NUMBERS
217	1
219	1
220	1
221	1
228	1
234	1
236	1
240	1
249	1
257	1
260	1
290	1
297	1
301	1
303	1
309	1
310	1
312	1
315	1
323	1
326	1
344	1
347	1
360	1
362	1
366	1
401	1
412	1
425	1
446	1
448	1
458	1
472	1
548	1
629	1
643	1
655	1
690	1

TABLE 1 (CONTINUED)

PPR BUSINESS FREQUENCY DISTRIBUTION

NUMBER OF TRANSACTIONS	NUMBER OF STOCK NUMBERS
0	696
1	33
2	27
3	30
4	17
5	11
6	12
7	7
8	6
9	2
10	6
11	8
12	4
13	4
14	3
15	3
16	1
17	7
18	2
19	4
20	3
21	2
22	2
23	1
24	1
25	1
26	3
27	1
28	2
29	1
34	1
36	3
37	1
41	2
42	1
43	2
44	1
45	1
46	1
47	1
50	1
51	1
54	1
57	1
58	1
60	1
64	1
66	1
68	1
75	1
81	1
95	1
101	1
107	1
108	2
112	1
113	1
114	1
116	1
132	1
135	1
145	1
146	1
165	1
168	1
177	1
182	1
188	1
190	1
195	1
210	1
221	1
249	1
266	1
267	1
291	1
313	1
314	1
316	1
335	1
341	1
342	1
400	1
429	1
506	1

TABLE 2

UNPLANNED BUSINESS FREQUENCY DISTRIBUTION

NUMBER OF TRANSACTIONS	NUMBER OF STOCK NUMBERS	NUMBER OF TRANSACTIONS	NUMBER OF STOCK NUMBERS
0	188	55	1
1	201	56	1
2	93	57	2
3	61	58	1
4	36	59	1
5	33	61	2
6	31	62	1
7	26	63	1
8	16	64	1
9	17	65	2
10	11	68	1
11	12	71	2
12	14	72	1
13	12	73	2
14	5	74	1
15	7	75	2
16	11	77	2
17	11	79	1
18	8	80	2
19	8	83	1
20	6	89	1
21	4	91	1
22	7	95	1
23	4	96	1
24	3	97	1
25	1	100	1
26	4	106	2
27	3	107	1
28	1	108	1
29	2	109	1
30	1	115	2
31	2	117	1
32	3	119	2
33	3	121	1
34	2	129	1
35	3	130	2
36	3	133	1
37	4	135	1
38	1	137	1
40	3	142	1
41	1	149	1
42	2	154	1
43	1	156	2
44	1	160	1
45	3	165	1
46	3	181	1
47	4	187	1
48	1	197	1
49	3	208	1
50	1	219	1
51	1	228	1
52	3	260	1

TABLE 3

NUMBER OF TRANSACTIONS	NUMBER OF STOCK NUMBER
261	1
290	1
294	1
296	1
312	1
315	1
344	1
528	1
605	1
612	1

TABLE 3 (CONTINUED)

CASREPT BUSINESS FREQUENCY DISTRIBUTION

NUMBER OF TRANSACTIONS	NUMBER OF STOCK NUMBERS
0	777
1	79
2	25
3	10
4	12
5	13
6	11
7	7
8	1
9	2
10	2
11	1
12	2
13	1
16	3
17	2
18	3
20	2
23	1
24	2
29	1
31	1
83	1
126	1

TABLE 4

PPR BUSINESS FREQUENCY DISTRIBUTION
WITH TOTAL BUSINESS FREQUENCY 20 OR GREATER

NUMBER OF TRANSACTIONS	NUMBER OF STOCK NUMBERS
0	59
1	3
2	5
3	3
4	5
5	3
6	2
7	5
8	1
9	2
10	5
11	5
12	4
13	1
14	3
15	2
16	1
17	6
18	2
19	4
20	3
21	2
22	2
23	1
24	1
25	1
26	3
27	1
28	2
29	1
34	1
36	3
37	1
41	2
42	1
43	2
44	1
45	1
46	1
47	1
50	1
51	1
54	1
57	1
58	1
60	1
64	1
66	1
68	1
75	1

NUMBER OF TRANSACTIONS	NUMBER OF STOCK NUMBERS
81	1
95	1
101	1
107	1
108	2
112	1
113	1
114	1
116	1
132	1
135	1
145	1
146	1
165	1
168	1
177	1
182	1
188	1
190	1
195	1
210	1
221	1
249	1
266	1
267	1
291	1
313	1
314	1
316	1
335	1
341	1
342	1
400	1
429	1
506	1

TABLE 5

UNPLANNED BUSINESS FREQUENCY DISTRIBUTION
WITH TOTAL BUSINESS FREQUENCY 20 OR GREATER

NUMBER OF TRANSACTIONS	NUMBER OF STOCK NUMBERS	NUMBER OF TRANSACTIONS	NUMBER OF STOCK NUMBERS
0	2	58	1
2	2	59	1
4	1	61	2
5	5	62	1
6	4	63	1
7	2	64	1
8	1	65	2
9	1	68	1
11	3	71	2
12	4	72	1
13	4	73	2
15	1	74	1
16	2	75	2
17	1	77	2
18	4	79	1
19	2	80	2
20	6	83	1
21	4	89	1
22	7	91	1
23	4	95	1
24	3	96	1
25	1	97	1
26	4	100	1
27	3	106	2
28	1	107	1
29	2	108	1
30	1	109	1
31	2	115	2
32	3	117	1
33	3	119	2
34	2	121	1
35	3	129	1
36	3	130	2
37	4	133	1
38	1	135	1
40	3	137	1
41	1	142	1
42	2	149	1
43	1	154	1
44	1	156	2
45	3	160	1
46	3	165	1
47	4	181	1
48	1	187	1
49	3	197	1
50	1	208	1
51	1	219	1
52	3	228	1
55	1	260	1
56	1	261	1
57	2	290	1

TABLE 6

NUMBER OF TRANSACTIONS	NUMBER OF STOCK NUMBERS
294	1
296	1
312	1
315	1
344	1
528	1
605	1
612	1

TABLE 6 (CONTINUED)

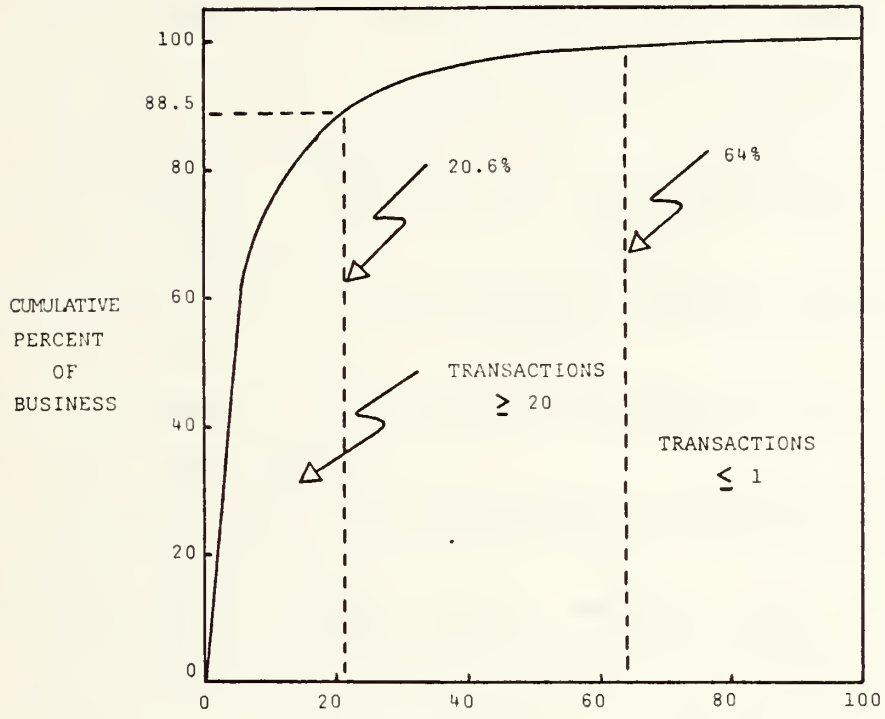
UNPLANNED BUSINESS FREQUENCY DISTRIBUTION
WITH TOTAL BUSINESS FREQUENCY 20 OR GREATER
AND PPR BUSINESS FREQUENCY ZERO

NUMBER OF TRANSACTIONS	NUMBER OF STOCK NUMBERS
20	3
21	4
22	5
23	2
24	2
25	1
26	1
27	2
29	1
32	2
33	2
35	1
36	1
37	1
38	1
40	3
43	1
45	1
47	3
48	1
49	2
52	2
55	1
61	1
62	1
65	1
71	1
77	1
96	1
100	1
130	1
133	1
135	1
160	1
228	1
290	1
312	1
315	1
344	1

TABLE 7

APPENDIX I

CENILE RECORD MALDISTRIBUTION CURVE



GRAPH 1

APPENDIX J

ALTERNATE NIIN CODES

The alternate NIIN relationship code is a two digit code that indicates the preference relationship between a NIIN and its alternate and the usability classification. The first digit of the code has the following meanings:

0,2	Equal parts or consumables. Preferred item is alternate.
1,3	Different repair parts. Preferred item is alternate.
4	Equal parts or consumables. Preferred item is prime item.
5	Different repair parts. Preferred item is prime item.
6	Equal parts or consumables. Neither item is preferred.
7	Different repair parts. Neither item is preferred.

The second digit of the code indicates:

1	Prime and alternate are completely interchangeable.
2	Prime and alternate are substitutable for each other only in common applications.
3	Prime and alternate are sustitutable for each other only in certain

serial numbers of common applications.

4 Preferred item can be substituted for all applications of the non-preferred item. Non-preferred item can be substituted for preferred only in common applications.

5 Preferred item can be substituted for all applications of the non-preferred item. Non-preferred item can be substituted for preferred only in certain serial numbers of common applications.

6 Rework-Preferred item is to be obtained by modification of non-preferred item. Planned modification: All material in stock must be reworked before issue. Phased modification: Scheduled modification. Non-preferred can be used until modification complete.

7 Rework: Emergency Modification.

0 Degree of relationship not determined.[18]

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